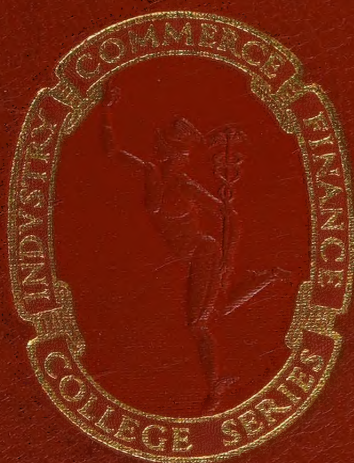




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AMERICAN INDUSTRY AND COMMERCE

BY

EDWARD DANA DURAND

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PREFACE

This book aims to present a general picture of American industry and commerce. In a country of great area and complex economic life such an undertaking necessarily involves the omission of many details of considerable importance in themselves. Special stress has been laid upon international comparisons, upon the interrelations of the various economic activities, and upon the general course of recent economic development. The earlier history of industry and commerce is traced only in broad outline. Various other works have covered that field. The trends since the beginning of the present century are discussed with greater fullness; they are the more significant because the forces at work are largely of a continuing character, so that economic movements for some time to come are likely to be in the same direction.

This volume is being put through the press during a time of considerable recession from the high business activity which has characterized most recent years. But unless there is some grave defect in the general deductions drawn throughout its pages as to the nature of the forces which have caused the broad upward movement of American industry and commerce in recent decades, this recession, like most others of the past, is likely to be of rather short duration. The direction and the rate of flow of the secular tide of economic life are, from the national point of view, more significant than the cyclical waves that temporarily disturb the surface.

The facts here set forth are so numerous as to preclude the possibility, within reasonable limits of space, of citing the sources from which they are derived. The author has relied almost entirely on authoritative statistical publica-

tions, largely government publications. This does not mean that in all cases the original sources have been consulted, for the Federal government issues several statistical summaries which bring together in convenient form data from a large number of governmental and private sources, domestic and foreign.

The author has refrained in general from presenting tables of statistics, believing that the general picture can better be seen by means of diagrams; on some of these, however, the figures are entered along with the graphic presentation. This method is the more appropriate because the actual data change more or less from year to year. Those who may wish more precise statistics, or data for the latest year, must consult other publications. For a very large proportion of the subjects such material will be found in the Commerce Yearbook (Volume I, United States; Volume II, Foreign Countries), the Statistical Abstract, and the Monthly Survey of Current Business, published by the Department of Commerce; in the Yearbook of Agriculture, published by the Department of Agriculture; in the Monthly Labor Review of the Department of Labor; and in the Federal Reserve Bulletin.

Because of the fluctuations from year to year in many economic phenomena, often resulting from purely temporary causes, extensive use is made of averages for periods of years. However, during recent years a steady upward trend appears in many branches of industry and commerce, so that the figures for the latest year available at the time of writing may be more representative than an average for a group of years.

The author is greatly indebted to several of his colleagues in Washington, who have read various chapters of this book in manuscript or proof and have made valuable suggestions. Especially should be mentioned Dr. Frank M. Surface, Dr. Francis Walker, Mr. Fred G. Tryon, Dr. Helen M. Strong, Dr. Edward G. Montgomery, Mr. Edward Eyre Hunt, Mr. A. Lane Cricher, and Dr. Joseph A. Hill.

E. DANA DURAND

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INTRODUCTION

The United States is universally recognized to be the richest nation of all history. It is also known by all to be making rapid strides in wealth and prosperity. Americans are no more convinced of the world leadership of their country in material things than are foreigners; indeed, the latter are the more apt to have an exaggerated conception of it.

It is the purpose of this book to give more definite content to this often vague picture of the economic position of the United States. It aims to set forth systematically the major facts regarding the present riches of the country, the character and magnitude of its industries and commerce, and the history of its material development, especially during recent decades. It seeks to discover the basic causes of American prosperity and progress and to sketch the more important of those proximate and derivative forces for efficiency into which these underlying factors translate themselves. Finally, it undertakes to discuss the relation of the general economic status and trends of the country to the well-being of the masses of the population.

However soberly and conservatively one may set forth the economic position and development of the United States, he runs the risk of being misconstrued. He may be charged with chauvinistic boasting; with failure to grasp the true values of life. He may be held up as merely another of the proverbial American "dollar-chasers."

As a matter of fact the true philosopher or historian recognizes the economic life of any country as a subject well worthy of his careful study. It is of enormous importance both in itself and in its influence upon all other aspects of human existence. Economic forces have played a part in history perhaps more potent than that of all other forces

combined. He whose primary interest is in the "higher life" of the individual, the nation, or the race will still regard a thorough understanding of the material as essential to an understanding of the spiritual. The richer a nation, the more its economy merits analysis. The wealth of the United States is bound to have an immense influence, for good or for ill, on the future of its own people and of the whole world. It thus demands the interest of the historian, the philanthropist, and the philosopher as well as that of the economist, the statesman, and the man of affairs.

The economic analyst, however, is under no obligation himself to discuss the bearings of the material things he describes upon the spiritual side of life. That side does not lend itself to the type of exposition which is natural in his special field. It is not a realm of demonstrable facts, of cold statistics, but of impression and opinion. The economist may well be content to furnish the background for the broader but less precise study of the sociologist, the æsthetic critic, and the moralist.

It is not beside the point here, however, to insist that these wider and higher aspects of the nation shall be approached in the same dispassionate spirit that is demanded of him who deals with economic conditions and economic history. They should be studied as objectively as their nature will permit. Hasty assumptions and *a priori* conclusions should not be tolerated merely because hard and fast facts are lacking. The foreigner who attempts to assess American civilization must guard against the warping of his judgment by unconscious jealousy or fear of the economic greatness of the country. The American critic must guard against being dilettante or sentimental and, above all, against the desire to be smart and to show his own superiority above his fellows.

There is a disposition on the part of some to treat wealth as in itself an unworthy thing, to condemn without trial the individual or the nation that happens to possess it. The mere phrase "almighty dollar" is deemed sufficient to banish

America to the limbo of outer darkness. Economic progress is taken as tantamount to moral and æsthetic decline. The fate of older empires that waxed fat merely to decay is cited.

Such prejudgment is as unscientific as it is unjust. The verdict as to a country's civilization must rest on real evidence, not on mere assumption or superficial analogy. National life is not a simple thing to be easily assayed.

Wealth to some individuals may indeed prove a curse, but both reason and experience support the opinion that for most individuals decent material surroundings honestly gained and fair opportunity for material advancement by honest endeavor afford the best soil in which to grow the fine flowers of life. Enthusiasm for the blessings of poverty is the prerogative of him who has never been poor. The hut of the anchorite, the attic of the genius, the humble cottage of the lovers — these have a romantic appeal, but, for the most part, a factitious one. Doubtless in occasional instances poverty has furnished the stimulus for high endeavor or the spring for noble virtue; far more often it has smothered them.

|| Judgment as to the standing of America in civilization will be affected in considerable measure by the basis one chooses. To some the gauge is afforded by the attainments of the few most cultured citizens; to others the general level of the plain appears at least as significant as the height of the mountain tops — the living and cultural standards of the masses appear of great importance. Even if he proceeds only from the first of these points of view the unbiased critic will remember that he may not expect a single country to outshine the whole world; he will compare the United States with other individual nations. He will not look for more cultural achievements in a century than the foreign country has piled up through a millennium. Nor will he confine attention to any one aspect of civilization: he will rate practical ethics in business as well as moral philosophy, architecture as well as music, the popular magazine as well as the sonnet. He will try to view the whole and not the part.

In so far as some branches of American art and literature may fall short in comparison with other nations, the explanation is neither far to seek nor in any way discreditable. It is natural that in a newly settled continent, where the unlocking of rich natural resources offers such opportunities for great achievement, most men of brains should devote themselves to that enterprise and relatively few to creative work in æsthetic lines. The desire for self-expression and the desire for the approval of one's fellow men, motives with most human beings more powerful than mere greed of gain, turn to the avenue that lies widest. Under certain circumstances of time and place that avenue is war, under others politics, under others art, and under still others business — the production of material wealth. In a land of vast size and great undeveloped capacities business has a lure that is absent in the long-exploited country, especially the country of small area. As America has filled with people that lure has been growing less insistent, and during recent decades the proportion of its able men and women who have turned to other endeavors has markedly risen. The same trend will no doubt become more and more strong as time goes on. The future of art in the United States is not to be judged from present levels. It is not without promise for the future that past devotion to economic development has brought to great numbers of Americans a competence such as permits them, if the spirit urge, to choose pursuits that offer little or no financial reward. It is not without promise too that the economic status of the common people and their opportunities for education are such that the seed of artistic capacity among them has better chance for fruition than in countries where the masses are steeped in poverty.

When the situation of the rank and file of the population is thrown into the scalepan, the balance tips more in favor of the civilization of the United States. The most conspicuous feature of American economic life is the widespread well-being of the common people, the steady upswing of their living standards, and the relative ease with which the man

who possesses energy, brains, and character can rise from the ranks to high station. One need not hold a brief for the entire justice of the distribution of wealth in America when he maintains that nowhere else, in the past or in the present, has the lot of the vast majority been so comfortable or their outlook so hopeful. Even if this position of the masses counted for nothing with respect to culture, it would still be a big credit for America in the balance sheet of human values. Happiness is the goal of humanity, and a comfortable material life is a large factor in happiness. The fact that the common people of America fare so well is, moreover, an important indicator as to the moral standing of the country.

Even from the strictly cultural standpoint the masses in the United States apparently stand ahead of those in most other countries. As judged by ideal standards their taste may be low; as judged by comparison with what is found elsewhere it is at least reasonably high. The common people possess in exceptional measure both the means to afford and the education to enjoy things which appeal to the æsthetic sense. Some of what they hear and see and read is of good quality, and a great deal of it is better than nothing at all. That there is in the United States so vast an outpouring of the mediocre in literature and art is the natural result of the widespread demand for food for the mind and spirit on the part of those who till recently got almost none of it. Beyond question the taste of the common man and the common woman in America has steadily risen; with the ever more abundant and more advanced education furnished them it is bound to advance still further.

Before forecasting for America the decline which befell certain rich empires of the past, one must probe deeper than the mere fact of the possession of wealth: he must consider how it has been gained, distributed, and used. The slightest study of history discloses at least one great gulf between the United States and such countries as Assyria, Egypt, Macedonia, and Rome. In those empires national wealth and power were chiefly the fruit of military conquest, and they were the heri-

tage of a small surface stratum of kings and nobles and warriors, of landlords and merchant princes and usurers. There was little of that efficiency in production which is at the root of American prosperity. The vast body of the population remained poor, downtrodden, ignorant, and without share in the government. Many of them were held in downright slavery. Might made right. It was not unnatural that the potentate who owed his gorgeous luxury to the exploitation of the people of his own or other lands should fall a victim to moral decline. Moreover, the strength of these older nations was sapped by failure to recruit the directing forces from the great reservoir of energy and brain power among the submerged millions. No picture of economic, political, and social life could be more different from that which we view in modern America. A nation which has won wealth by the toil of the leaders as well as the masses, and in which the masses share it in large measure, has at least one deep-laid ground for confidence in the future.

America's wealth and America's civilization — however one may evaluate it — are not the product of Americans alone. The people have not made themselves: still less have they made the land they inhabit. They have built much of the edifice, but the foundations were theirs mainly by inheritance or by gift.

If the population of the United States is of high average capacity, it is largely because the Old World gave so much to the New. "God sifted a whole nation that he might send choice grain into the wilderness," said an early governor of Massachusetts Bay. From Europe America has received good blood, sound tradition, and age-long accumulation of experience and wisdom. It is an absurdity to think of American civilization as sprung from virgin soil and wind-swept seed. To speak of modern times as young is to reverse the hands of the clock. The world today is older than ever before. It is crude enough still, but tens of centuries have worked toward its ripening. The United States is a newly settled land, but its people and its civilization are the fruit

of the ages. What of pride the citizen has in America must be in large part pride in the European stock, pride in the history of the race which produced the nation of which he is proud. By the same token Europe may take pride in its offspring.

Besides this rich heritage from the Old World the people of the United States have been blessed with splendid gifts of nature. They possess a continent of abounding natural wealth, free from the overcrowding which is the greatest bar to well-being in Europe and Asia. For each of them there are at work broad acres of fertile lands, great stores of mineral wealth, mighty sources of mechanical energy. The sheer magnitude of their country is a great economic asset. It makes for large production, for political strength, and for peace. The one flag floats over an area half as large again as that of all the twenty-six states of Europe with the exception of Russia. The boundaries which make a checkerboard of the European continent constrict the markets for goods and hamper productive enterprise. They deprive each people of that variety of resources which spells economic self-sufficiency and economic security. They are, moreover, a fertile source of friction and conflict. It is not especially because Americans are more sane and peace-loving than European peoples that war has less often ravaged their land and that national defense throws a lighter burden on their income: they have no potential enemy at their threshold; they are blessed with geographical isolation.

Americans have done much to win this great continent for themselves. The pioneers had noble faith and courage; they endured many hardships; but it was, after all, a fortunate accident of history that through the ages there had lain practically empty and waiting for them a land of such resources. It was largely mere fortune of history that so vast an area came to be a single nation.

That the people of the United States have thus fallen heir to a rich past and to a rich environment should breed in them a sense both of gratitude and of responsibility. To

deserve such blessings Americans must be ready to share them. Riches, like nobility, create obligation. The obligation calls for no surrender of legitimate rights, no neglect of proper self-interest, no mawkish international charity, but for justice, coöperation, and sympathy in dealings with other peoples. The prosperity and progress of America should be a powerful force for prosperity and progress throughout the world. It is not for Americans in any condescending spirit to offer aid or to set up as schoolmasters. They have much to receive as well as much to give, much to learn as well as much to teach. But the wealth which by good fortune is theirs does bring with it the possibility and the duty of exercising a large measure of leadership in the economic life of the world and, if they prove worthy, a large share of leadership in all that constitutes civilization.

If the people of the United States take this attitude toward their wealth, the fear which it sometimes arouses among foreign peoples will lose all justification. Let a country but deal justly and its strength and advancement are bound to help other countries. More today than ever before is the economic world tied together. If no one land ever becomes rich, the world cannot become rich. That here and there should exist a land in which a competent people and abounding resources meet is the best hope for the nations with less competent people and resources less rich. The prosperous country, even if it seeks to do so, cannot keep all its wealth to itself. Except when, in hostile spirit, it resorts to military force or active political intervention, its economic strength can rarely prove a disadvantage to any other nation; that strength may perhaps work hardship to some individual competing industry in a foreign land, but normally any such loss is more than offset by gains in other directions.

For the first time in history man has reached a height whence he can dimly see ahead the Promised Land. From the material standpoint, at least, the Utopia of the philosophers and the romancers seems no longer an altogether idle dream. Only in recent times has man acquired scientific

methods of research. Discovery and invention nowadays proceed by logical method, and their results are adequately recorded. Each achievement becomes thus a sure stepping-stone to another. Barring moral breakdown or catastrophic war, mankind may be reasonably confident of a steady march forward in the conquest of nature. It is all for the good of the human race that there should exist, in America or elsewhere, an environment that affords exceptional opportunity for the advance of science and the practical application of its results.

In yet another respect the analyst who describes the industries and commerce of the United States runs the risk of being misunderstood. Because he must of necessity show that there exists an exceptional measure of efficiency in business and of well-being among the people he may be thought to appear as an advocate of every American institution and practice. He may be charged with assuming that in a land so fortunate whatever is right, that there is no conflict of interests between classes, no injustice in the distribution of wealth.

It is true that the real prosperity and progress of the country and the real well-being of the masses of the people (as judged, of course, by comparison with other peoples and other periods of time) do constitute strong arguments in support of the general soundness of American economic and political institutions and policies. They do put the burden of proof on any group that seeks change in the basic principles and practices. But it by no means follows that everything in the United States is the best in the world, still less the best that can be. It is altogether probable that many minor changes (perhaps some that might even rank as major changes) in institutions, laws, customs, and methods might make for still greater efficiency and for greater justice between classes in the community.

He who paints a cheerful picture of America need not be

charged with ignoring the existence of difficulties and friction. He need not be supposed blind to the questions that agitate the wage-earner, the farmer, the business leader, and the consumer. It should be obvious, however, that it is impossible in a single volume both to describe an economic organism so vast and complex as that of the United States and to discuss the problems that confront it. Each of half a dozen or more of the fundamental questions would itself call for a treatise. To express bald conclusions without the arguments in support of them would lay the author open to attack on all sides. Moreover, the attempt to combine discussion or dictum concerning controversial matters with a factual presentation must inevitably obscure the picture. As in the case of the "higher life," the analyst of national wealth may feel his task accomplished when he supplies a background for the discussion of these economic problems.

AMERICAN INDUSTRY AND COMMERCE

CHAPTER I

INCOME AND STANDARDS OF LIVING

SECTION 1. THE NATIONAL INCOME AND ITS DIFFUSION

Family incomes in the United States are the highest in the world. The aggregate income of the American people is at least one fourth of that of the entire world. The best available estimate puts the present annual total at approximately \$90,000,000,000, almost \$750 for every man, woman, and child, and about \$3000 for every family. Each year the people earn more than five times the principal of the Federal debt, immensely swollen though this is by war expenditures.

The income of a nation is the most comprehensive and the most significant measure of its economic strength. The national income is in substance¹ nothing more nor less than the sum total of the goods and services currently produced; from the opposite side, the sum total of the goods and services currently consumed, plus what is saved and added to the permanent patrimony of the country.

National income is a far more basic yardstick than national wealth, if we use that term in the narrow sense as connoting the assets of the people at a given time. Millions live wholly from the earnings of current effort, with no dependence on accumulations of the past, and the income so received is often far from small. As between nations, also, differences in income may be by no means parallel with differences in stored-up wealth. The national wealth of the United States is several times greater than that of

¹ The statement requires qualification only with respect to the return received on investments abroad or paid to foreigners on their investments in this country.

any other country, but this comparison is much less significant than that of income.

No country has a precise statistical return of national income:¹ it can be approximated only by estimate; the figures for the United States involve less guesswork than those for most other countries. The disparity in per capita income between the United States and other nations is, however, much too great to be explained by defects in data; nor can it be offset fully by the fact that costs of living are somewhat higher in America than in most parts of the world.

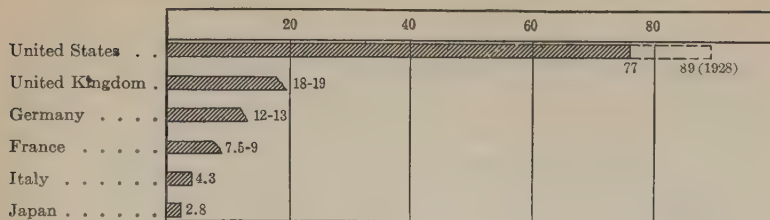
The League of Nations has recently put out a compilation of the estimates of national income made (usually by private institutions or individuals) in a number of major countries. Converted to dollars, part of these are shown in Fig. 1.

The data cover twelve countries besides the United States. For 1924 the aggregate income of these twelve, which in general are much richer than most other countries of the world, was estimated at about \$56,000,000,000. For the United States alone the figure in that year was nearly \$80,000,000,000. These twelve countries have a population about two and one-half times that of the United States. According to these estimates their combined income averaged less than \$200 per capita compared with nearly \$700 for the American people. If, to cover possible underestimate and differences in cost of living, one should add a third or even a half to the totals for the other countries, the disparity would still be of the order of more than two to one.

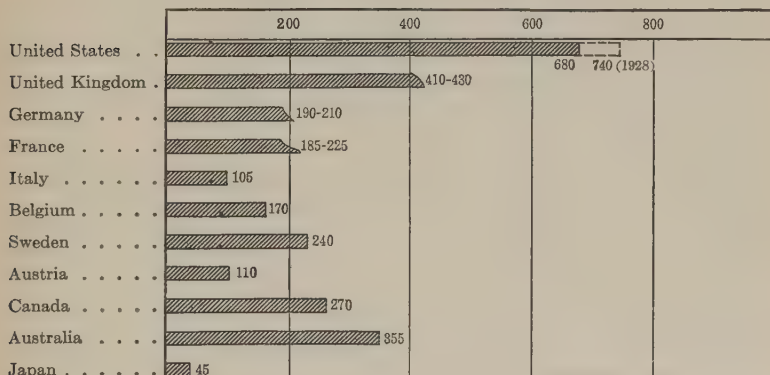
The European countries for which estimates of income are available include somewhat less than half the population of that continent; they have an estimated total income of about \$50,000,000,000. Among the countries listed are all those which are best off, save three or four of relatively small population. The many millions of Russia, Poland, and the Balkan States are poorer even than the poorest people covered by the data. It seems reasonable, therefore, to

¹ See further discussion of the validity of estimates of income on page 9.

A. TOTAL NATIONAL INCOME, IN BILLIONS OF DOLLARS (1924)



B. AVERAGE INCOME PER CAPITA, IN DOLLARS



C. PER CAPITA INCOME ADJUSTED FOR COST OF FOOD, IN DOLLARS

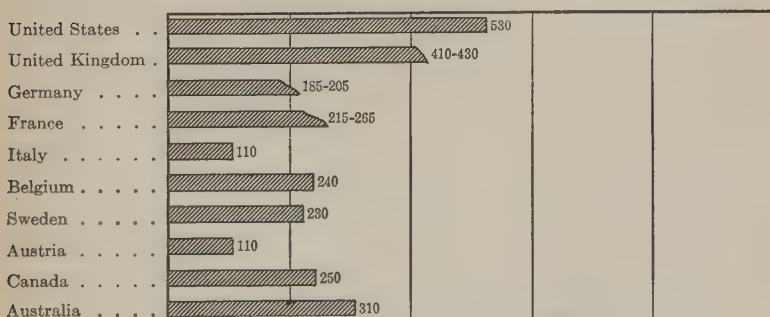


FIG. 1. Diagram showing the comparative income of leading countries

As is more fully stated in the text, all these estimates of income are subject to a considerable margin of error. For several countries the range of two or more estimates is shown by the irregular ends of the bars. The estimates mostly relate either to 1924 or to 1925. The adjustment of the per capita income according to variations in the cost of food (section C) probably understates the relative position of the United States because many more advanced commodities are relatively cheaper than elsewhere (see text). The adjustment is based on the indexes shown in Fig. 2, B

suppose that the aggregate income of all Europe, with nearly four times the population of the United States, is little if any more than \$80,000,000,000, which does not exceed the American figure alone. Most of the non-European countries are less fortunate even than the poorer countries of that continent. Japan, China, and India together account for some two fifths of the population of the world. The extremely low figure estimated for incomes in Japan (\$45 per capita) may be considerably below the truth, but it gives some idea of the economic status of these hundreds of millions of Asiatics. Latin America, as a whole, ranks much below Europe in wealth. Europe and the United States together have nearly one third of all the people of the world. It is more than probable that their total income represents over half, possibly three fifths, of the world's income. The aggregate income for all countries very likely lies between \$275,000,000,000 and \$325,000,000,000. The American people, with about one sixteenth of the world's population, enjoy between one fourth and one third of all the goods and services created by mankind.

Comparisons with individual countries may be made with greater confidence. The national income of the United States is over four times that of Great Britain, the next richest country, and it is about six times that of Germany, which not so long ago seemed near to political domination of all Europe. More significant are the per capita figures. According to these estimates the average person in the United States has from 60 to 70 per cent more income than the dweller in the United Kingdom, over three times more than the average German or Frenchman, and six or seven times more than the Italian. Much more favorably still does income in America compare with that in Japan and in many other countries of the world.

As already stated, estimates of comparative income require some qualification by reason of the fact that the cost of living is lower in most countries than in the United States. The difference, however, is often much exaggerated. Opinions on

this point are largely affected by the experience of American tourists, and the things which they compare are for the most part not typical. The tourist goes bargain-hunting. He finds an embroidered gown or some article of silver far cheaper perhaps than in the store at home. He forgets that the article is a handmade specialty to which American machine methods and mass production are not adapted. He has not inquired the price of wheat or of shoes or of automobiles or of gasoline. He finds too that only small tips are expected in the foreign hotels; that the wages of servants are far less than in American cities. He assumes that everything must be cheap because workers get but little. He overlooks the fact that in the United States mass production and large use of capital make the cost of many things lower than elsewhere, despite high-paid American labor.

Broadly speaking, those goods and services in which by the nature of things human effort can be little aided by capital are cheap in Europe and still cheaper in Asia or in Africa. Cheapness especially characterizes personal services, buildings (whether purchased or rented), handmade textiles and jewelry, and other handmade specialties. On the other hand, articles imported or made from imported materials are naturally no cheaper abroad than in the United States (except so far as American duties may add more to the price of certain classes). The same is true even of those domestic commodities of any country, such as major agricultural products, which are directly subject to foreign competition or which can themselves readily move out into world markets. Finally, in most countries those articles which can advantageously be produced with large use of capital and in great quantities are actually dearer than in America. This is evident from the fact that the United States exports these in great volume. Articles of this sort form a large part of the total cost of living in America and a relatively small part in most other countries.

Owing to differences in the character of consumption and to variations in grades and qualities of commodities, no close

statistical comparison can be made between the costs of living in the several countries of the world. The International Labor Office, a branch of the League of Nations, regularly compiles estimates of the cost of the "food basket" of the workingman's family in certain large cities of Europe and America. These estimates have some significance as indications of the cost of living. Their utility is limited, however, by the fact that they cover only a fraction of consumption — an especially small fraction in the United States, with its high standard of living. It is probable that if the American wage-earner or farmer or merchant should move to Europe and attempt to maintain there precisely the mode of living that he maintains in the United States, he would find the cost little lower. The comparative costs of the "food baskets" in the early part of 1928, in the form of indexes, with London taken as 100, are shown in Fig. 2 on page 15. It will be seen that the Philadelphia cost is about 28 per cent higher than that of London or Berlin, and that the excess as compared with several other European capitals is considerably greater. These differences in the cost of the "food basket," however, even if they could be taken as representative of the total cost of living, fall short of the disparities in income by a large margin. The averages of per capita income, adjusted according to the cost of food, are shown in Fig. 1.

Income in several of the European countries was greatly cut down by the war, and has scarcely yet regained its former magnitude. The war interrupted the advance in the United States, though it did not wholly check it. Since the armistice American income has moved forward rapidly. Even before the war, however, the United States was the richest country in the world. Per capita income (without adjustment for differences in the cost of living) was nearly half again as high as in England, about twice as high as in France and Germany, and more than three times as high as in Italy. The disparity as compared with Czarist Russia was far greater still.

A higher income means a more than corresponding difference in the ability to command comforts and luxuries, those things that have so much to do with making life worth living. The first increment of income goes for bare necessities. In the poorest countries a large fraction of the people lack a sufficiency even of these. As income becomes larger, consumption extends to less necessary goods, to comforts, and finally to luxuries. The family with an income of \$2500 may readily spend ten times as much for nonessentials as the family that receives only \$1000.

Validity of Estimates of National Income

Estimates of national income must be taken with much reservation. Whether they are based on tax returns, or on reports of sample incomes, or on the summation of the value of different classes of products and services, there is inevitably a large margin of error. Even in the United States, which has fuller statistics than almost any other country, there are no comprehensive data as to the values created by the vast numbers engaged in mercantile, professional, and so-called personal-service pursuits, and these can be approximated only by very rough methods of estimation. Different experts have arrived at totals for the national income of the United States varying as much as 10 per cent. The estimates used in this chapter and the chapter that follows are those of the National Bureau of Economic Research, a private organization.¹

The margin of error in the estimates for most other countries is probably greater than for America. In a country

¹ These estimates for a series of years, as revised and published in the report of the Committee on Recent Economic Changes (McGraw-Hill, 1929), are shown in Fig. 10. The published totals do not include such annual profits of corporations as are not paid to stockholders in dividends. In the opinion of many persons, including the writer, these profits should be included. They have averaged about \$2,500,000,000 annually during the years since 1923. The estimates as published give \$77,100,000,000 for 1924 and \$89,000,000,000 for 1928. Adding undistributed profits of corporations brings the total to \$78,700,000,000 for 1924 and (approximately) \$92,000,000,000 for 1928.

where the chief industry is agriculture and where even manufactured goods are largely made in the home or in very small shops, such estimates may readily be too low because of undervaluation of those products which do not enter into general markets but are consumed by the producer or his immediate neighbors.

The conversion of foreign statistics of income into terms of dollars involves a serious problem where currency is in process of rapid depreciation or appreciation. In such cases exchange rates may not reflect the buying power of the currency within its own country correctly. Some attempts have been made to refine exchange rates by calculation of the change in the buying power of the currency in each country as compared with some prewar year. The refinements, however, are themselves subject to a large margin of error, and it has been deemed best in this volume to make conversions strictly according to exchange rates. It is possible that in the case of Italy and France, where until recently the exchange rates were unstable, the conversion of national income to dollars results in some understatement. The exchange rates for most of the other countries covered were fairly stable in 1924, the year to which, for the most part, the income data relate.

The Distribution of Income

Averages sometimes conceal a great gulf between extremes. The high per capita income of the United States might conceivably reflect merely vast riches in the hands of a few. Nevertheless the fact that the general average is so high creates a strong presumption that the masses of the people could not be poor. The great total of American incomes means, of course, very large production of goods and services. The few, however extravagant, could hardly consume the bulk of such a vast output. Moreover, a production of such volume would scarcely be possible without mass methods, and these imply a multiplication of units which

must find purchasers by the hundred thousand or by the million. Nor would it be possible without high productive capacity on the part of the working masses. They could not do such efficient work if they were poverty-stricken, underfed, sickly, uneducated, discontented. We shall see in a subsequent section that, as a matter of fact, many articles of luxury and semi-luxury are used in such numbers in America as to show clearly that they reach the hands of a great proportion of the "common people."

The available statistics of individual incomes, derived from the returns for Federal taxation, indicate that, even if the widest possible allowance is made for error, very large incomes can account for only a small part of the grand total for the nation. In 1926, when the income of all the people was estimated at over \$80,000,000,000, the reported individual incomes exceeding \$10,000 totaled only about \$9,000,000,000. Even were this figure doubled, there would still remain for division among the masses of the people over \$60,000,000,000, or about \$2200 per family. This average for small and moderate incomes is higher than the average of all incomes combined in the richest country outside the United States.

It is possible to obtain more directly an approximation as to family incomes of the working classes. In 1927 the average annual wage in factories¹ — computed by dividing the total paid in wages by the reported average number of wage-

¹ The data are those of the biennial Federal census of manufactures. It is not clear whether this average understates or overstates actual average annual earnings. The average number of wage-earners is intended to represent the number that would be required if all were continuously employed; and if this were in fact correctly ascertained, the average annual wage rate would be greater than actual average earnings on account of periods of unemployment. But as a matter of fact workers not actually drawing pay on a given report date (the number on the fifteenth of each month is called for) are not infrequently included in the returns, because their names appear on the pay roll covering the week, and consequently the "average number of wage-earners" is greater than would be required if all were continuously employed. On the whole, it would appear that for a normal year, such as 1927, the division of the total wage bill by the "average number of wage-earners" represents pretty closely the actual average earnings per worker.

earners — was almost exactly \$1300. This figure includes women and children; adult men earn considerably more. But the typical working-class family is not dependent exclusively on the income of a single person; often the wife or a son or daughter joins with the head of the family in earning money for its support. For the country as a whole, in all branches of industry, the number of persons reported as "gainfully occupied" is 70 per cent greater than the number of families. Taking this fact into account, and allowing for lower earnings on the part of women and young persons, it appears that the total income of the typical factory worker's family must be at least \$2100, perhaps as high as \$2400. This is roughly three fourths as much as the average income for all families in the community, including the richest.

Wages of certain other important groups of workers are higher than those of the factory employees considered as one class, although there are many individual manufacturing industries in which wages compare favorably with the highest paid in other branches. Thus, taking the country over, the average union scale of wages in the building trades is not far from \$1.50 per hour, or as high as \$65 per week of forty-four hours, the prevailing working time in this field. Work in these trades is somewhat seasonal, though much less so now than formerly. It is likely that in ordinary times the skilled building worker averages from \$2000 to \$2500 in the course of the year. Again, the employees of the American railways, a very considerable proportion of whom are unskilled workers, receive on the average nearly \$1700 yearly. This includes salaried persons, as well as wage-earners; but the majority of clerical employees of the railways earn no more than the average wageworker, and the high salaries of the few bring the average for salaried workers only a little above that for those paid on the wage basis.

International comparisons as to the distribution of wealth and income among different classes of the community are impracticable. In any case greater interest attaches to the

more readily available information regarding wages and standards of living of the masses. Were it true, for example, that disparity in income is wider in the United States than in China, the fact would remain that the income of the common man is several or many times larger in the one than in the other, and this fact is much the more important. How far the man at the top of the ladder stands above the man on the lowest rung counts less than how far the latter stands above the ground level of bare existence.

SECTION 2. THE AMERICAN WAGE

Statistics of wages confirm the evidence drawn from those of national income that the common man in America earns a much better living than his fellow in most other countries. The American wage-earner is the best-paid in the world. This is true not only of the amount of money he receives but, even after making all possible allowances for differences in living costs, of the buying power of his wage.

The most authoritative wage comparisons among countries are the statistics compiled by the International Labor Office at Geneva. That office adjusts the money rates according to the cost of food and the rents of working-class dwellings (see page 8). These costs are considerably higher in the United States than in most other countries, and hence the adjusted wage indexes show less difference than appears in the money wages. As already stated, however, many articles and services of the more advanced type, which enter into the budgets of the families of most skilled American workers, are actually cheaper in the United States than in Europe. It is possible, therefore, that the data for money wages exaggerate the position of the American wage-earner by no larger a margin than the data as adjusted for cost of food and rent understate his advantage in real earning power. Fig. 2 compares the actual money wages of two major groups of workers in Philadelphia with those in large cities of other countries.

Perhaps partly by reason of the recent great volume of construction in America, building workers receive wages higher than in most other occupations, even after allowing for the fact that employment in the building trades is often slack during the winter. There is little if any greater seasonal irregularity in these trades in America than in other countries covered by the table, but the absence of any "building boom" in most European capitals renders the comparison with American wages scarcely typical. Nevertheless the fact that workers in this field in Philadelphia receive three times as large a money wage as those in London or Stockholm is striking. The disparity as compared with most countries of Europe is much greater still. The Philadelphia wage is nearly seven times that in Paris and eleven times that in Brussels.¹

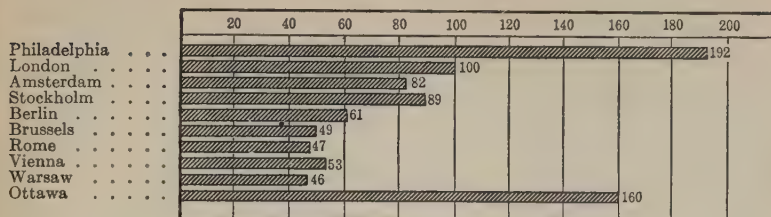
Only a little less marked are the disparities between American and European wages in the metal-working trades — those making machinery and other similar products. The figures for these classes of workers are in all respects fairly comparable. Here Philadelphia is nearly three times higher than London, four and a half times higher than Paris, and six times higher than Rome.

Even on the assumption that differences in the cost of food ² correctly reflect those in the general cost of living, the American worker has a wide lead over the European. In the case of the building trades the adjusted average for Philadelphia ranges from nearly two and one-half to six times those for the foreign capitals, other than Ottawa; for the metal trades the adjusted American wage ranges from two to five times those in Europe. Approximately the same

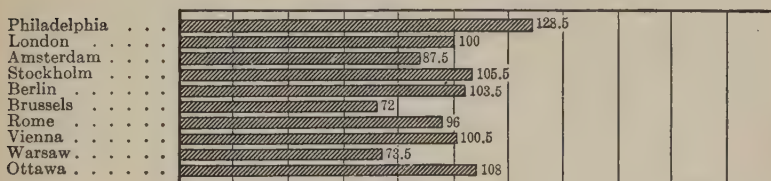
¹ These two comparisons, as well as that with Rome, are probably affected somewhat by the fact that the rise in wages had not kept pace with the fall in the exchange value of the currency in France, Belgium, and Italy; but the currencies in all three of these countries had been stable or rising for more than a year before the date for which the wage data are given.

² The adjustment of wages for the building and machinery trades is based on cost of food alone; that of the general index shown at the top of the diagram is based on both food and rent.

A. INDEX OF WAGES ADJUSTED FOR COST OF FOOD AND RENT (LONDON AS 100)



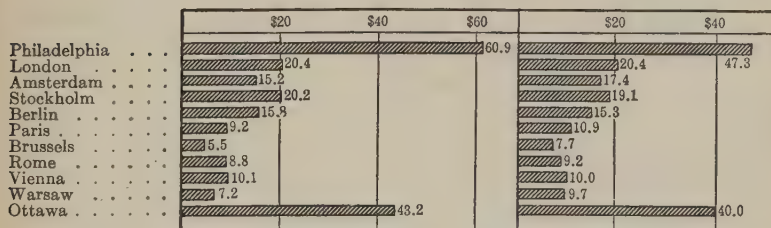
B. INDEX OF COST OF FOOD (LONDON AS 100)



C. AVERAGE WEEKLY WAGES

a. THE BUILDING TRADES

ADJUSTED FOR COST OF FOOD



b. THE MACHINERY TRADES

ADJUSTED FOR COST OF FOOD

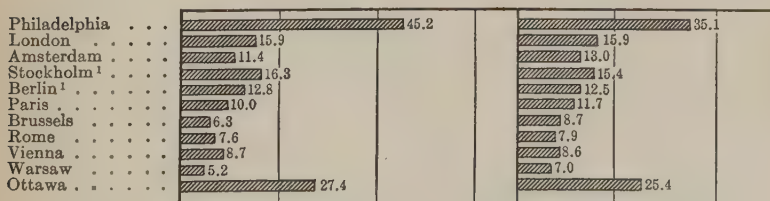


FIG. 2. Diagram comparing wages in leading cities of the world, 1928

Based on reports of the International Labor Office. The adjustment for cost of living probably understates the relative position of American labor (see text)

¹ Wages of printers, which are practically the same as in machinery trades.

differences appear in the combined general index of wages. Here Philadelphia leads London, the highest European city, by 92 per cent and surpasses Brussels, Rome, and Warsaw by four to one.¹

An extensive government inquiry in Italy in 1925 revealed that wages in a large number of manufacturing establishments in the principal industries averaged 17.8 lire per day. At that time the lira was worth a little more than four cents. To be sure, the average given includes women and children as well as men; but even in the industries which employ men almost exclusively the averages all fell below 31 lire, or about \$1.30, and were mostly in the neighborhood of 25 lire. In the United States the average earnings of the factory workers, skilled and unskilled, for both sexes and all ages are about \$27 per week, or \$4 per day, and for men alone the average is \$30 per week.

The conclusion is clear: job by job and trade by trade, American wages in terms of money are from two to five or six times higher than in Europe. The disparity as compared with Asiatic and most Latin-American countries is still greater. The only countries where wages approach those in the United States are Canada, Australia, and New Zealand. Differences in cost of living suffice to offset only a fraction of the spread in wages between the United States and the Old World. The opinion of the toilers in foreign lands as to wage standards in America is witnessed by the mighty stream of immigrants that poured into the country so long as its gates remained wide open. At the recent International Economic Conference in Geneva the representatives of labor were one with the representatives of capital and of the general public in holding up American conditions of labor as a goal toward which other nations must strive.

A curious side light on this matter is shown by a propagandist document issued a few years ago by a communistic

¹ The general index covers, in addition to the skilled building and machinery workers, unskilled workers in those branches and also workers in the printing and furniture industries.

organization in Europe. This declared, in substance, that American labor had ceased to play its part in world movements for revamping society because the capitalists had bribed the workers with big wages. The implication of the document was, to be sure, that it is only skilled and organized labor in the United States that gets the good wages, and that common labor shares little in the benefit of economic efficiency. As a matter of fact, the unskilled American worker has fully as great a lead over the unskilled worker overseas as does the skilled worker over those in his class. In America as in Europe the spread between wages of those of varying degrees of skill was lessened as a result of the World War.

SECTION 3. PRODUCTION AND CONSUMPTION IN THE UNITED STATES

The high position of the United States as regards standards of living is likewise demonstrated by the detailed facts concerning the production and consumption of specific classes of goods, the nature of the industries and occupations of the people, and the extent of the aids to human labor in production. Such facts go to show that in proportion to their numbers the American people produce more and consume more than those of any other country. The only foreign lands which can compare are Canada, Australia, and New Zealand, all of which resemble the United States in being new countries and in having derived most of their population from northwestern Europe. The masses in the United States enjoy many commodities and services which in most parts of the world rank as luxuries attainable only by the few.¹

One of the clearest indicators of the high standard of living in America is the distribution of occupations, the relative

¹ A large proportion of the data in this section appear in the *Commerce Yearbook*, Volume II. Some of the statements are in the nature of summaries of facts more fully set forth in subsequent chapters.

importance of the different industries and classes of service. Only a country with large per capita production could afford to direct its productive energies into such channels. A relatively small proportion of the labor and capital of the United States suffices to produce the prime necessities required for the entire population ; a large proportion can thus be devoted to goods and services that either partake of the nature of comforts and luxuries or serve further to build up productive capacity for the future.

In most countries the great majority of the people have to work on the soil in order to wrest from it enough barely to feed and clothe the nation. In the United States, with its abundant land and high output per farm worker, only a fourth of the population is agricultural, and the proportion would be very much smaller but for the high quality of the American diet, in which meat, dairy products, and fresh fruits and vegetables play a far larger part than in almost any other country. On the other hand, the proportion working in factories, elaborating raw materials into finer, more advanced articles, is much larger in the United States than elsewhere, with the exception of three or four countries in western Europe which have to export a great proportion of the output of their factories to pay for food and necessary materials which they cannot themselves produce. In America, moreover, mining employs exceptionally large numbers because of the demand for vast quantities of fuel for power and heat and the similar demand for the metals, the major material in capital goods. Distribution and transportation claim great numbers of workers and immense amounts of capital, indicating both the large volume of goods to be handled and the high standards of service demanded. Finally, the professions, which render the highest, and in a sense the least essential, of services, employ relatively more persons in America than anywhere else.

Another evidence of the high per capita production of the United States is afforded by the abundance of the aids available for human labor. Part of these are natural re-

sources; part are man-made. In proportion to its population this country has more good agricultural land and richer mineral deposits than almost any other country. The amount of capital employed in all branches of production is without parallel and is increasing steadily and rapidly. On the average, for example, each factory worker (including salaried employees as well as wage-earners) is aided by about six thousand dollars' worth of capital in the form of plant, equipment, stocks of materials and goods, and other kinds of working capital. One of the evidences of this great use of capital is furnished by the statistics as to mechanical power. The combined consumption of the sources of power — fuels and the energy of falling water — in the United States is substantially equal to that in all the rest of the world put together. On a per capita basis American consumption surpasses that of Great Britain, which ranks first among European countries, by about 70 per cent.

Statistics are available to show the share of the United States in the world's total production and consumption or use of a large number of commodities and services. Some of these are set forth in Fig. 3. Unfortunately there are not world data as to many commodities and services of the luxury or semi-luxury type, which are particularly significant as indicators of standards of living. Naturally much greater disparity appears among nations in the consumption of these than in that of sheer necessities. The well-to-do man does not use his additional means to cram his stomach or pile more cloth on his body. He may even eat and wear less, in terms of weight or of calories or of warmth, than his poorer neighbor. He presumably seeks more delicate food and more elegant raiment, but for the most part his wealth goes to gratify wants of a different type — wants which the poverty-stricken can scarcely hope to gratify at all, of which, indeed, he may hardly even be conscious.

Perhaps the most important material contributing to the production of elaborate goods and advanced services is coal, the greatest source of power and of process heat for industry,

SHARE OF TOTAL FOR THE WORLD

UNITED STATES

ALL OTHER COUNTRIES

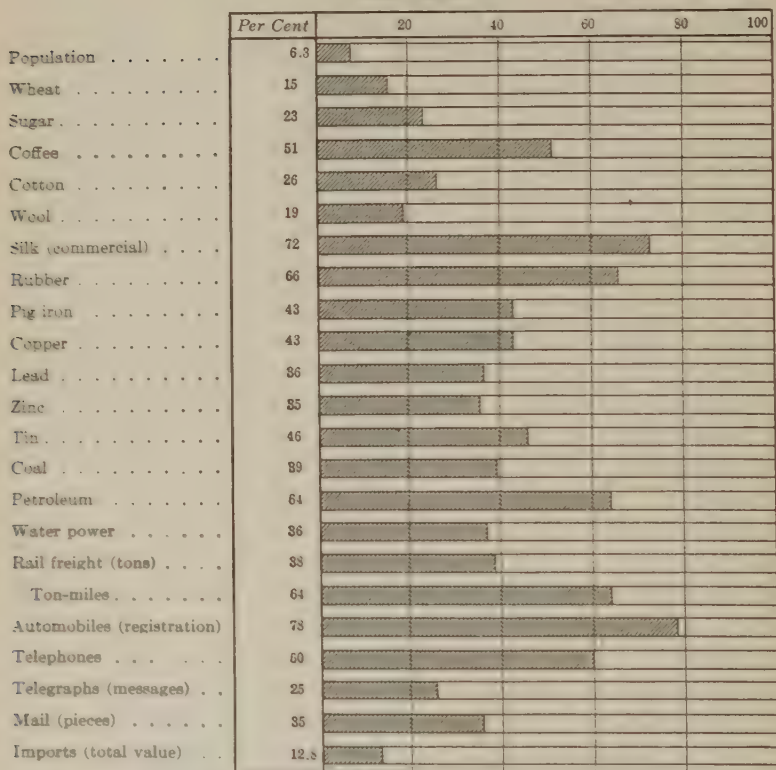


FIG. 3. Diagram showing the share of the United States in the consumption or use of typical commodities and services

The data for commodities represent not production but consumption. Some of them are subject to a certain margin of error, since totals for the world are not precisely known

as well as of heat for the home. The United States, with about one sixteenth of the population of the world, produces and consumes approximately two fifths of the world's coal. Of the world's developed water power it possesses over one third. In the case of petroleum, which has become of special significance in connection with the motor car, it produces seven tenths of the total and consumes nearly as much.

The position of the United States with respect to the major metals is equally favorable. Large use of metals reflects large use of capital goods, especially of machinery, and this in turn means large production of other things. Metals are also the major material in multitudes of modern devices for convenience and comfort in daily life. The United States consumes nearly 45 per cent of the world's iron, the king among metals, and about the same proportion of copper, that index of electrical development. Its share of the use of lead and zinc is well over one third. It has its own supply of these four major metals and exports them largely besides ; but its wealth enables it to import likewise a very large fraction of the world's output of those metals which are not found at home, the most important of which are tin and nickel.

A more direct indication of the vast use of machinery in the United States is afforded by the fact that the country makes between 55 and 60 per cent of all the machinery manufactured in the world, with a wide lead over England and Germany, the two principal European countries in this field. Although much American machinery is exported, at least nine tenths of the output is put to use in the United States itself, with a consequent steady addition to the productive capacity of industry.

A very significant indicator of economic development is furnished by the movement of freight. The American railways carry three eighths of the weight of commodities handled by those of all countries combined. Their proportion of the ton mileage is very much higher, hauls averaging far longer than in most other countries. Of course volume of transport is not a direct measure of the output of commodities. In many agricultural countries of the Old World the bulk of what is produced never goes beyond the farm or the neighboring village. Nevertheless a big railway tonnage is evidence not only of large aggregate production but especially of large production of the more advanced commodities. The American railways carry approximately eleven tons of freight for each person in the country every year ; the

corresponding per capita figure for Great Britain and France is seven tons, for Germany six tons, and for Italy less than two tons.¹

Turning now to commodities more directly used by the people, we find that American consumption of the principal textile fibers is a large fraction of the combined total for all countries: about 17 per cent for wool, 26 per cent for cotton, and much over half for silk.² The proportion is thus the highest in the case of the most expensive of these materials. The United States also takes a dominant share of such fibers as manila, sisal, and kapok. This large consumption of textile materials is a clear evidence that the masses of the American people are exceptionally well clothed. The typical man, and still more the typical woman, has many more garments than the average person in most other countries, and variety adds interest and attractiveness to the raiment. More important than the quantity of textile materials used, however, is the fineness and consequent dearness of the fabrics in common use in America.

Of late the automobile has come to serve as a customary gauge of the wealth of nations; it is, indeed, a very significant indicator. Almost four fifths of all the motor cars of the world are found in the United States. There could be no more significant evidence of high standards of living than the fact that the country has one passenger automobile for every five or six persons in the population, twenty-two million of them for twenty-seven million families. At least three families out of five — perhaps as many as seven out of ten — possess one or more motor cars. Millions of American wage-earners and millions of American farmers are able to afford

¹ This comparison is not vitiated by the fact that in some countries (for example, Germany and France) river and canal transportation is relatively more important than in the United States. This disparity is more than offset by the enormous traffic on the American Great Lakes and by the great volume of motor traffic in the United States.

² The proportion, 72 per cent, shown in Fig. 3, refers to silk entering into commercial channels. In addition, Far Eastern countries produce a good deal for purely local consumption.

a car. In most countries the automobile is wholly out of the reach of the "common people." Whether the motor car be viewed as a necessity or as a luxury, it is a big item in the family budget of the owner. The American motorist (not the rich man, but the average owner) spends on his car what would provide the entire living of many a family in eastern Europe or in Asia or Africa. Not far from one tenth of the national income of the United States goes into the purchase and operation of automobiles.

The only countries which compare at all closely with the United States in motor-car registration are Canada, Australia, and New Zealand, where the ratios range from one car for ten inhabitants to one for fifteen (these ratios include commercial vehicles, and the corresponding figure for the United States is one vehicle to five inhabitants). In the countries of western Europe the ratios vary from one for forty (in the United Kingdom) to one for two hundred and sixty (in Italy). In eastern Europe and in most of the countries of other continents the relative numbers of cars are far lower: Russia has one for about eight thousand inhabitants; China, one for about twenty thousand.

Rubber has become largely a satellite of the automobile. The United States consumes two thirds of the total output of this commodity despite the fact that all must be imported from distant lands. Moreover, the multiplication of cars has brought about a very cyclone of road-building in America. Only a decade or two ago its roads were much inferior to those of western Europe; today the reverse is true: in proportion to population the United States has far more strictly first-class roads than any other land. It spends in the neighborhood of a billion and a half dollars annually in building and maintaining highways, a sum probably at least double the expenditure for this purpose in all other countries put together.

The telephone is another test of the standard of living. The United States possesses six out of ten of the telephones in the entire world. The number is more than two thirds as

great as that of families ; and although many of the instruments are used in business offices, it is probable that at least half the homes in the country are provided with this means of quick and easy communication.

There are scores of other articles which partake of the same general character as the motor car and the telephone — devices of modern invention, more or less elaborate and costly, which serve to make daily life in the home, the store, and the office more convenient, enjoyable, and efficient. The washing machine, the vacuum cleaner, the sewing machine (nowadays often run by electric motor), the mechanical refrigerator, the radio and various other electrical devices, the phonograph, the piano (perhaps with its automatic player), the gas stove, the steam or hot-water furnace (often automatically fed with fuel), the bathtub, the typewriter, the multigraph, and the dictaphone are but samples from the long list. As to most of these articles there are few statistics of production or use in other countries, and as to a good many even data for the United States are lacking. Nevertheless the broad situation is clear. The position of America is suggested by the fact that throughout the world many of the articles of this type are commonly called "American specialties." Of every one of those listed above, and of practically all others in the same general category, the United States is, even in proportion to its population, by far the largest producer ; and although it exports certain of them in large numbers, its domestic use is several or many times greater, save in one or two cases, than its exportation. Indeed, the use of many such articles in America is much greater than that in all the rest of the world together. The significant point is that not few but millions are able to afford these modern conveniences ; indeed, their relative cheapness is due to the wide use that makes mass production possible. Multitudes of farm and working-class families possess things of this sort that to the masses of most countries appear as truly luxuries as the gold tableware of the prince or the multimillionaire.

It is true that the small use of these devices in most other countries is not wholly due to the inability of the people to afford them. It results in part from unfamiliarity with their advantages, perhaps even with their existence, and in part from preference for other ways of spending income. Certain American specialties, including American automobiles, are spreading rather rapidly in foreign countries. However, the principal limiting factor in the use of advanced and expensive commodities in most parts of the world is the relatively low income or downright poverty of the masses.

Housing

The house is a conspicuous and trustworthy indicator of the manner in which a people lives. To English-speaking peoples especially the word "home" connotes far more than a shelter: it reflects things social, æsthetic, and ethical. Among peoples at all advanced in civilization housing represents a large fraction of the family budget, often from one fifth to one third of the total.

Americans are exceptionally well housed. There are no adequate statistics on which to base comparison with other countries. Scattered and partial data, however, supplemented by the general observation of this most easily observed phenomenon, show clearly that in almost no other land are the dwellings of the masses of the people so commodious, convenient, comfortable, and hygienic. In Continental European cities (even those of only middle size) nearly all the people live in flats — "rent barracks," the Germans call them. New York, on its narrow island, is probably the only city of the United States where this is true of as many as half the inhabitants. In most American cities the typical apartment house shelters not the poor family but the family of moderate or even large means, which seeks thus to save care and responsibility. In England, as in the United States, the workingman in a majority of cases has a separate dwelling; but it is much inferior in itself and in its yard and

other surroundings. Many million European working-class families live in dwellings of a single room; relatively few have three or more rooms. Farm homes in America are likewise larger and more comfortable than those in most other parts of the world. The thatched cottage of Europe may be picturesque, but it is very often leaky and crowded and unsanitary. Scores of millions of peasants in eastern Europe, to say nothing of Asia or Africa, live in dwellings that scarcely deserve a better name than hovels.

Both in city and country American houses possess "modern conveniences" that are rare even in western Europe and almost unknown in other regions of the world. Very commonly they boast bathrooms, closets, porches, electrical equipment, and central heating. They have more light and air than foreign dwellings. These advantages are in part due to the fact that so many American houses are new. This newness is natural in a rapidly growing country; but it is the more conspicuous because the wealth of the people has enabled them to replace inferior structures with better ones, especially during recent years. Between 1920 and 1928 approximately twenty billion dollars was spent in the United States in erecting residence buildings. This sum was several times greater than all Europe was able to devote to that purpose (aside from the reconstruction of dwellings destroyed by the war) during this period of impoverishment. It was probably at least twice as much as all Europe ever spent in any nine years of history.

Education, Literature, and Art

Education is discussed elsewhere as one of the causes of American wealth. It is also a major evidence of widespread well-being among the people. Instruction of the young involves not only expenditure of money but also the sacrifice of time that might be devoted to immediately productive work. The United States gives both money and time in a measure approached in few other countries. Whether edu-

cation be viewed as a necessity or as a luxury, it is something that most peoples afford but meagerly. Practically all American children get at least from five to eight years of schooling, about two out of five attend intermediate schools, and about one out of ten goes to the college or the university. Annual expenditures for education are more than \$2,500,000,000, over \$20 per capita of the entire population and about \$70 for each person between the ages of five and twenty. All these ratios are several or many times higher than are found in most countries; except the ratio of the number attending elementary schools, they are far higher than even in the richest and most enlightened countries of western Europe.

Closely connected with America's educational effort is the vast outpouring of what, in greater or less degree, deserves the name of literature and art. To discuss the merits and demerits of the output in this field falls far outside the scope of a book on economics. Some at least of the work of American authors and artists is of no mean quality; much more, no doubt, is of inferior order. It may be maintained with some reason that even that which is mediocre is better than nothing; that wide consumption of it by the masses of the people may count as much for civilization and well-being as consumption by the few of work of higher quality. The point which concerns us here, however, is the witness to national wealth that lies in the very large extent to which the American people are able to afford books, periodicals, pictures, music, and other forms of art.

Judged by foreign standards, the production of these in the United States is nothing less than enormous. The printing and publishing industry is one of the largest in the country. The periodical branch of it takes in about a billion and a half dollars annually. A single issue of an American Sunday paper or of one of the most popular weeklies contains more reading matter than enters the home of the average eastern European or Asiatic in a year or that of many a western-European working-class family in a month. To be sure, most Americans pay relatively little directly for

the periodicals they buy: the cost is met largely by advertising. But the immense expenditure for advertising is another evidence of high standards of living. The things advertised are in large part such as the masses in most countries of the world cannot afford to buy.

Recreation and Amusement

American expenditure for recreation and amusement is also much greater than that in most other countries. The giant arenas and theaters and baths of the Romans suggest that they perhaps devoted as large a share of the national income to amusement as Americans do; but for the most part these were maintained by tyrants as a sop to the masses — to make them forget their otherwise miserable lot. Too often, moreover, the entertainment appealed to the lowest in men. The quality of American recreation and amusement leaves much to be desired, but it compares more than favorably with that in most other countries of today, to say nothing of ancient times. And the volume is very great. The provision of amusement gives employment, directly or indirectly, to hundreds of thousands. Admissions to theaters, concerts, and other entertainments amount to almost a billion dollars each year. Immense sums are spent at amusement parks and in transportation to them. Coney Island, Atlantic City, are names on every tongue. Baseball daily draws its scores of thousands. A prize fight brings a million dollars or more in gate receipts. Golf and tennis and other sports claim multitudes of devotees, and these are mostly expensive forms of recreation. Summer vacations in the country, at the seashore, or in the mountains are by no means the luxury of the few. Several hundred thousand Americans each year seek foreign lands and spend seven or eight hundred million dollars there. The biggest recreation item of all is riding and touring by motor car.

Americans traveling abroad and foreigners traveling in the United States bear uniform witness that far more money

(though perhaps not much more time) is spent in recreation and amusement in America than in the richest of Europe's states. The European of moderate or small means is apt to spend his evening at the café or the beer garden. There he hears some music, perhaps sees some simple entertainment; it all costs no more than the price of a modest meal and a few cents for wine or beer. The American of similar circumstances goes to the variety show or the amusement park or the motion picture or the ball game. He spends the better part of a dollar, perhaps a good deal more, for admission and incidentals. In a typical provincial town in Europe — say of from twenty to fifty thousand people — you will find two or three unpretentious motion-picture houses. They are often open only on Saturday and Sunday. In such a town in the United States half a dozen or more far more elaborate houses are open daily. Even vast London or gay Paris boasts no such number of theaters and other places of amusement as New York. For that matter, in the more popular capitals abroad a large part of the patronage of the more expensive "shows" is that of American tourists.

"The Wasteful American"

The foreign observer views American expenditure for such obviously desirable commodities as good housing, motor cars, silks, fresh fruits and vegetables, and telephones with a wonder that partakes both of approval and of envy. His wonder at the large spending in certain other directions is often tinged with ridicule, however. "Americans have money to burn — and they burn it" is a common verdict. They are charged with wasteful extravagance in things that merely tickle the palate, things whose only appeal is that of vanity or fashion or passing amusement. The foreigner cannot understand the crowds about the soda bar or at the absurd "stunts" of the amusement park. A hundred million dollars spent each year for chewing-gum and a still larger sum for cosmetics seem to him senseless extravagance, though as to

cosmetics many a foreign nation is in no position to cast stones. Wasteful appear to him also the hundred-page Sunday newspaper, the hourly week-day editions, the countless cheap magazines.

No doubt Americans spend their income none too wisely; they could get much more real satisfaction out of their money than they do. By greater intelligence in buying and using them they could acquire more and better things even of the kind that with their present conceptions seem worth having. More important still, with the cultivation of taste and judgment and ethical sense the people might find that a change in the direction of consumption — seeking more of this and less of that — would add greatly to the value of life. There is much in the contention that in America consumption lags behind production in efficiency.

But the people of the United States are by no means the only offenders in their spending. Unquestionably they spend in what may with fairness be called extravagance or even wastefulness much more in absolute amount than most foreign peoples. Whether they thus spend a larger share of their income is not so sure. Opinions will differ according to the critic's view as to what is worth while in life. In most countries, for example, wine, beer, and stronger beverages take no small slice out of the national income. Despite all the bootlegging in the United States, the absolute expenditure for these is much less per capita than in most other countries, and in proportion to the income of the people it is probably less than in any of the countries of Europe. Many a poor man abroad tries to make up for the drabness of his life by resorting to the cup that cheers and that may inebriate. Tobacco too is used in most foreign countries almost if not quite as widely as in the United States, though nowhere else is there such insistence on high and expensive quality in the "weed." Moreover, every people has certain special forms of extravagance, just as each specializes in certain branches of production. The Asiatic too often wastes his money as well as his health on opium.

Jewelry and other trinkets have great appeal to the savage and the semicivilized.

However Americans may compare with others as to the judgment with which they spend, it remains a significant fact that they can afford to spend far more on what is needless than the people of most other countries. Even their wasteful expenditure reflects the "cost of high living." Whether they want what they should want or not, they get what they want in measure unequaled elsewhere; and this is true not merely of the "classes" but of the masses.

SECTION 4. WORK AND LEISURE

Important to the general well-being as is large production of goods and services, a great part of the benefit would be lost if such production involved extreme expenditure of human effort. All work and no play makes Jack a dull boy. The enjoyment of abundance requires proper leisure. If his job is a decent one, the normal person likes well enough to work for a moderate length of time; beyond that, work becomes a burden, in some cases a galling burden. Fortunately the American standard of living comprises both large income and reasonable freedom from overwork.

Americans have the reputation of being hard workers. When they are on a job they "put in their best licks." Herein lies, no doubt, one of the important factors in the industrial efficiency of the country. Most of those who are capable of working do so. There is, especially among men, but a small "leisure class." "Soldiering" is comparatively rare. Holidays are not carried to absurd lengths. But, taking it all together, the burden of work for the people as a whole is lighter in the United States than in many other countries, if not in most.

As regards the proportion of the population engaged in productive work, distinction must be made between men and women and between adults and children. It is true of the United States as of all other countries that nearly all

adult men, except the sick and aged, have no choice but to work for a living for themselves and their families. The number of men who possess such a competence that they could, if they would, afford to live in idleness or to engage in those pursuits which bring no money return, is perhaps relatively larger in America than elsewhere, but it is still only a very small fraction of the total. Moreover, even of those Americans who are in this fortunate position, the majority actually work for gain, whether with the aim to pile up still more wealth, or from a sense of obligation to society, or merely for love of the game. Conditions in America were from the outset such as to create a respect for work. The notion that it is beneath the dignity of the highborn to engage in business has never arisen. Consequently there are few "idle rich" in the United States.

In certain countries of the Old World (to a much less extent today, however, than before the World War broke down timeworn traditions and impoverished great numbers of the propertied families) a different attitude toward work causes the community to lose the potential productive effort of a good many of its best and best-educated minds. It must not be forgotten, however, that a considerable proportion of the members of the leisure class in foreign countries have always done things which, although not bringing in money, are of real value to the world. As its life becomes more settled, the United States will unquestionably witness a gradual multiplication of the numbers who perform such unpaid services.

The Work of Women

The proportion of American women sixteen years of age and over actually reported as engaged in gainful occupations rose from about one sixth in 1880 to one fifth in 1900 and to one fourth in 1920. The great majority of these workers, however, are unmarried and young. In 1920 only 9 per cent of the married women were reported as having gainful occu-

pations. These figures, of course, in no way reflect the amount of work done by women; they serve merely to emphasize the fact that most women still find their place in the home.

The fundamental difficulty with statistics of the occupations of women lies in the definition of "gainful occupation." The United States Bureau of the Census, like those in most other countries, feels constrained to omit housework (home-keeping) from the list. This omission is not at all because the wife's task is considered unimportant or easy, but because it is not directly remunerated, and also because there is no way of gauging it, no basis by which to distinguish the woman who works strenuously and long in her home from the one who merely spends an hour or two daily giving instructions to servants. Moreover, many women who do work outside the home have not the same clear economic status that usually attaches to men; they are helping their husbands in the workshop or the store or the farm, and there is no way of determining from census schedules how long they are on the job or how much or how little they do.

It is certain that women in the United States work no longer and no harder now than formerly, despite the fact that the census reports a larger proportion engaged in gainful employment. The cause of this increase is clear. The volume of housework required is less than formerly. The number of children to be cared for is smaller. Improvements in dwellings and in household appliances have greatly reduced the effort of home-keeping. Still more important is the fact that much work that used to be performed in the household is now done in factories. This is true in considerable part of the preparation of food, of washing, and in still greater measure of the making of garments. Formerly even the cloth itself was often spun and woven by the housewife, to say nothing of fashioning it into clothing. As a result of these changes women are freer to seek employment in the factory, the store, or the office. This increase

in work outside the home is far from marking an increase in the amount or the strenuousness of their toil. On the contrary, it is a result of advancing standards of living, and at the same time a contributing cause of further advance. The tasks transferred from the home to the factory are performed there on a large scale with the aid of mechanical power and modern machinery; they may not always be better done, but without exception they are done with less human effort — in most cases with far less. The old saying "A man's work is from sun to sun, a woman's work is never done" is less true in America today than ever before.

The most casual observation — and, for that matter, the most careful observation — discloses the fact that women have an easier lot in America than in most other countries, if not in all. Their work is far less exhausting and prolonged in comparison with that of many millions of their sisters abroad. The sharpest difference perhaps is in the housework itself; the American woman has aids that are rare in foreign lands, and she escapes much that is there done in the home. Moreover, according to the official statistics of occupations the proportion of women who do gainful work outside the home is much higher in most countries than in the United States. Vast numbers of the women of the agricultural countries of the Old World work in the fields, something almost unknown in America except among the Negroes of the South. According to the official census figures, in Germany more women than men are reported as occupied in agricultural work, and in Poland nearly as many; the same is presumably true of Russia. Moreover, in the highly industrialized countries the proportion of women among factory workers is higher than in the United States. Out of five workers (wage-earners and salaried employees together) in American manufacturing industry, one is a woman; in Germany, Belgium, and England three out of ten. In French towns and cities multitudes of women earn their own living or contribute to the family income: they run stores and shops, take in sewing, fancy work, and washing, and do many other things. As

a matter of fact, there are in most foreign countries hardly more women of leisure than men. On the other hand, it can justly and without implying any criticism be said that a very considerable fraction of American women do relatively little work and have a great deal of time for self-improvement, recreation, and social life. The proportion who enjoy a large amount of leisure is unquestionably much higher than among men.

Child Labor

One of the conspicuous evidences of high standards of living in America is the fact that few children are forced to premature toil. The product of the child worker is not worth what it costs in injury to health, happiness, education, and future productive efficiency. Modern America proceeds on the principle that the place for the child is at school and at play; nowadays he is very commonly free even from that moderate amount of work at odd times and during school vacations which might be for his good.

Statistics of child labor are far from accurate. The difficulty of properly defining gainful occupation is here again insurmountable. It is clear from statistics of school attendance, however, that the number of child workers in the United States is very small, much smaller than in most other parts of the world. Moreover, this proportion is declining. Children are more and more being sent to the schools (see page 182). According to the census of 1920 only one in twelve of the boys and girls between the ages of ten and fifteen (inclusive) was reported as gainfully employed, and over half of these were "helping dad" on the home farm. Of boys of sixteen and seventeen years less than three fifths, and of girls of that age less than one third, were in gainful occupations. These proportions have fallen materially since the census year, as is shown by the fact that the number of pupils in intermediate and advanced educational institutions has increased by 70 per cent or more.¹ Although in the more

¹ Based on an estimate for 1928, the official data of the Bureau of Education for that year not yet being available.

advanced countries of Europe, as in America, child labor is restricted and school attendance required, there is nevertheless considerably more employment of young children, and much more employment of children above the age of fourteen or fifteen. In eastern Europe, as in the overcrowded agricultural countries the world over, children do far more and heavier farm work than in the United States.

Hours of Labor

The United States, then, cannot be charged with piling up riches by demanding labor from those who might better be freed from it. It does not exploit women and children. No

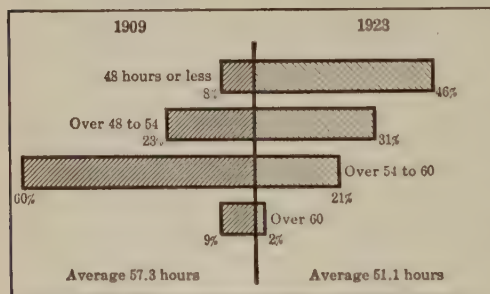


FIG. 4. Diagram showing hours of labor in American factories

The diagram shows, for example, that 46 per cent of factory wage-earners worked forty-eight hours or less per week in 1923. The shortening of working time since 1909 is also brought out. Some further reduction has occurred since 1923

more is its large national income gained from any exceptional prolonging of working hours. It is true that the customary hours of labor are essentially the same as those of western Europe. They are, however, decidedly fewer than in most other parts of the world.

Conditions in this respect in America vary considerably as among the several broad branches of industry and the more specific individual industries as well as from one part of the country to another. In manufacturing, mining, and construction the eight-hour day is widely prevalent, and often the Saturday half-holiday reduces the hours to forty-four per week; indeed in certain trades the "five-day week," of forty working hours, has recently been introduced in a number of localities. In the manufacturing

industries as a whole the average working time is fifty-one hours per week.¹ Nearly half (46 per cent in 1923) of the factory employees work forty-eight hours or less weekly, less than one fourth more than fifty-four hours, only one in fifty has a working week exceeding sixty hours, or ten hours per day. These figures for factories are fairly typical of mines and of railways, though in the latter the conditions often cause decided variations from normal hours for certain classes of employees.

Working time in stores is less standardized than in factories. The larger establishments very commonly conform to the hours locally customary for other workers. In smaller stores hours are often longer, though the actual effort is likely to be less continuous than in most other occupations. The proprietor of the small store often sticks at the counter longer than his employees do. The hours of work on farms are tending gradually toward standardization, but in many cases they still vary greatly with seasonal and weather conditions, and at times in summer may be much prolonged. The farmer who does all or most of the work without hiring help is apt to be a hard taskmaster to himself.

The eight-hour day is now at least nominally standard in most of the countries of Europe, especially in those that are more highly industrialized. For many years before the war the lessening of hours was perhaps the one goal most sought by the working classes, both of that continent and of America. During the war most governments felt it necessary to keep the wage-earners content, and the eight-hour day became widely prevalent, in many cases by means of national legislation. Since the war working time has, in actual practice, been increased in certain countries and certain industries of Europe. Laws often prescribe the eight-hour day as normal, but permit a limited amount of overtime, usually at a higher wage per hour. In the more advanced

¹ Computed from the data of the census of manufactures of 1923 (not available for later censuses), which classifies wage-earners according to the number of hours worked per week.

European countries and in some of the others as well the actual average working time in industry is not very different from that in the United States. The same is true of Canada, Australia, and New Zealand. On the other hand, the working time in the Asiatic countries is much longer. The new factory law in Japan limits hours in the principal manufacturing industries to eleven per day. In Chinese factories twelve hours is considered quite the proper thing, and the working day is often longer.

The question may be raised why Europeans, with their smaller average income, do not make up their minds to work longer than Americans and thus increase their output and earnings. A partial explanation lies in the prevalence among European wage-earners of the idea that there is not enough work to go round, that to shorten hours is to lessen unemployment. Too often the foreign worker fails to understand that in the long run both jobs and wages depend on production. As a matter of fact there is more excuse in Europe than in the United States for the disposition to restrict output. It is not so easy to turn to a new occupation if overproduction appears in a given field, nor is it so easy to expand the market for any particular product by lowering its cost. More important, perhaps, in explanation of the recent general reduction of working time in Europe is the conviction that excessive hours do not increase output, especially where the job is one that requires either severe physical effort or close attention. In many kinds of work almost if not quite as much can be accomplished in eight hours as in ten. In any case workers in Europe as well as America very generally feel that their wages would by no means be increased proportionally by adding to the time they work. They prefer greater leisure and less exhausting effort.

Some foreign workers, indeed, turn the tables and ask why the American wage-earner, with his high pay, does not prefer to work less, even if as a result his wage should be somewhat reduced. There are countries, especially in tropi-

cal regions, where if a man happens to get a little higher wage than usual he straightway knocks off work for a season ; idleness has greater charms than goods. It lies outside the province of this book to discuss the problem of a further reduction in the working time of labor. Suffice it to say that, save in those occupations where work itself is a sheer pleasure, the question of choice between more leisure and more output is bound to arise from time to time in a country where efficiency is high and advancing. Moreover, there may be occupations so exhausting that a further cut in hours of labor would add to production. In the long run, no doubt, the workers themselves (as groups, not as individuals) will virtually determine how long they will work, the decision resting primarily on their own interests and desires. How many would today be willing to sacrifice a fraction of their wage for shorter working time it would be hard to estimate. Broadly speaking, most American working men and women do not apparently feel the present hours of labor a grievous burden.

CHAPTER II

ECONOMIC PROGRESS OF THE UNITED STATES

The United States has throughout its history made rapid and almost unbroken advance in the production of wealth and in the well-being of its people. The pace of that advance since the World War has been perhaps faster than during any previous period.

In tracing American economic progress it will be convenient to distinguish between the nineteenth and twentieth centuries. Although only a certain sentimental interest attaches to the turn of the century as such, it happens that in America it approximately coincided with a basic change. Before that time the opening of new resources had been a major factor if not the dominant one in adding to the wealth of the people. Expansion in agriculture had been as conspicuous as expansion in manufactures. Natural forces had played a great part in progress. During the twentieth century those forces, although still important, have counted for much less. Human factors have been controlling. Growth of production has been far more conspicuous in the elaborate industries than in agriculture. The country has become by far the greatest industrial nation of the world.

SECTION 1. THE NINETEENTH-CENTURY EXPANSION OF AGRICULTURE

At the beginning of the nineteenth century the United States had barely emerged from the colonial status. Its population, but little over five millions, was surpassed by a dozen countries of Europe. The people were scarcely as well off as those of the leading European nations. By 1900

the United States claimed over seventy-five million people, and Russia was the only European country to equal it in numbers. Already it had become the wealthiest of nations, although it had as yet scarcely begun to play a very important part in world politics or in world finance. This nineteenth-century progress had a double aspect: expansion and intensification. The people spread out over the continent, and they settled more densely and used more effectively the territory previously occupied. These two aspects of the growth of economic activity corresponded in some measure to the two classes of forces which were at work: the natural and the human.

By good fortune vast territory for expansion came to the American people almost without effort. From the outset they had possessed a royal heritage — an area of nearly 900,000 square miles, five times that of present-day Germany. In the first decade of the nineteenth century the Louisiana Purchase, at a price less than the present assessed value of many a county within its confines, almost doubled this area. Before half the century had passed, the national boundary had swept across the continent, adding over 1,300,000 square miles more. These successive acquisitions anticipated the needs of the population; long before numbers had begun to press on agricultural resources new lands were ready to hand. Moreover, throughout most of the century the settlers, as they moved westward, found the lands that greeted them easier and easier to till. Had the great semiarid plains lain just beyond the Alleghenies, and the fertile prairies a thousand miles farther to the west, the history of America would have been quite different. Along the Atlantic coast the colonists struggled with forests, hills, rocks, swamps, and often with poor soil. Beyond the mountains they found forests still, but the land was level and mostly very fertile. Yet a little farther began the even more fertile prairies, lying ready for the plow. Transportation was all that was needed for a great development of agriculture, and transportation was soon forthcoming.

During the first half of the century the population more than quadrupled (see Fig. 5). In 1800 the people were mostly strung close along the Atlantic seaboard. States bordering the ocean accounted for over nine tenths of the total number. By 1850 the east-central states — the group west of the Alleghenies and east of the Mississippi — had far more inhabitants than the entire country could boast at the beginning of the century. As yet, however, only two millions had found their way beyond the Mississippi. The territory settled at the time of the adoption of the Constitution nearly trebled its population between 1800 and 1850, but by the latter date the newer sections of the country, which had almost no inhabitants in 1800, numbered eight and a half millions, or three eighths of the total for the entire country.

Down at least to the middle of the century the great majority of the millions added to the population went into agricultural pursuits. This was true even in the East, and much more so in the West and South. Though cities, as in the modern history of practically all countries, grew faster than the rural districts, they were of relatively small economic importance down to 1850. At that time less than 13 per cent of the people resided in cities of over eight thousand inhabitants. The population in small towns and in rural districts multiplied fourfold during the first half of the century. The progress of agriculture during this period was reflected in the considerable expansion of exports, most of which then consisted of farm products. Exports of commodities of domestic origin had been worth in 1800 only \$32,000,000; by 1850 they had reached \$135,000,000. The increase, however, was not faster than that in the population. Foodstuffs were not yet exported in important quantities; cotton made up over half of all exports, and tobacco about 7 per cent.

After 1850 agricultural expansion, although continuing vigorously in the east-central region, was most conspicuous in the west-central. The states between the Mississippi and the Rockies multiplied in population fivefold in thirty years

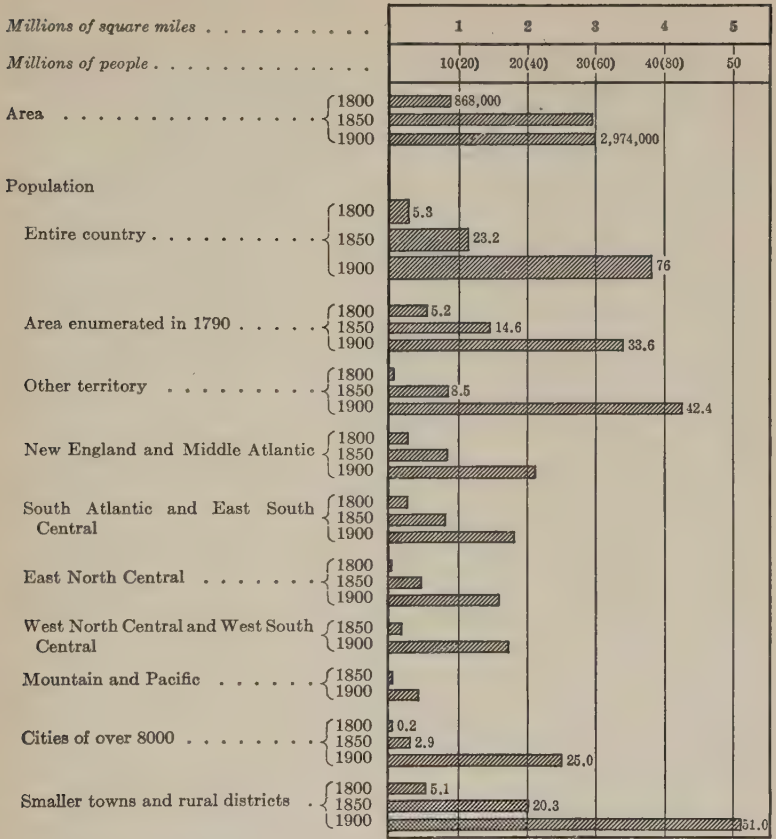


FIG. 5. Diagram showing the growth and geographical movement of population during the nineteenth century

How the westward expansion of population contributed to the growth of the country as a whole is shown most conspicuously by the comparison between the growth in the area covered by the census of 1790 and that in the rest of the country. The scale shown in parentheses relates only to the broad bars for the total population. For states in the several divisions see map in Chapter VII, Section 1

and ninefold by 1900. That this growth meant chiefly expansion of agriculture is evident from the fact that even at the end of the century only about one fifth of the people of the trans-Mississippi plains region were urban ; that is, dwellers in towns of over two thousand five hundred inhabitants. In

the meantime seekers for gold and other minerals, followed by stock-raisers and farmers, pushed farther west. In 1900 more than four millions lived in the Rocky Mountain and Pacific sections. The South likewise made much agricultural progress during this half-century, though the blow it suffered from the Civil War made its pace limping for a good many years.

The great advance in American agricultural production during the second half of the last century is familiar to all the world. The number of farms (see Fig. 6) quadrupled during this period, and the area of improved farm land expanded equally. Even if we go back no farther than the Civil War (systematic crop statistics first begin at that time) we find that between the ten-year period 1866-1875 and the corresponding period 1896-1905 the corn crop increased two and one-half times and the wheat crop even more, production of oats much more than trebled, and production of barley gained over sixfold. Even disregarding a few years of low production immediately after the Civil War, the output of cotton approximately doubled within two decades. These increases more than kept pace with population, which did not quite double between 1870 and 1900. The gain in the number of domestic animals and in the output of animal products was quite as marked as the gain in crops.

Although, with the still more rapid development of manufactures and mining during the second half of the century, the share of agricultural products in the total exports of the United States declined somewhat, the absolute increase in foreign sales from the farms was very great. This fact is obscured in the statistics of values by the great drop in the level of prices, which affected farm products even more than others. For the five years ending June 30, 1901, exports of agricultural products were valued at an annual average of \$827,000,000, as compared with \$165,000,000 for the period 1852-1856; taking into account changes in price the increase was at least sevenfold. Compared with the five years that immediately followed the Civil War, the gain in money

value (specie basis) was three and one-fourth times; in quantitative terms it must have been five or six times.

Great as was nature's contribution to the agricultural expansion of the nineteenth century, human ingenuity and thrift also counted for much. They provided transportation, indispensable for the winning of the West. The Erie Canal was opened in 1825, the first efficient highway for freight from the interior to the eastern coast. The Great Lakes and the Mississippi and its tributaries were early brought into service, and their importance grew greatly with Fulton's invention of the steamboat. The railway soon followed the waterway and proved a far more potent factor; there were nine thousand miles by 1850. Without the new transportation agencies the settlers of the interior would have had little motive for large production, for outside markets would not have been available to them.

Inventions in farm machinery, in which America became the leader of the world, likewise played a major part in the development of the new lands. McCormick's mower (dating from about 1830), the reaper, and later on the self-binding harvester made wide what had been the neck of the bottle of farm production. One man could now harvest more grain than many had garnered by hand methods. Improved plows and cultivators saved labor and also increased yields. The accumulation of capital by American farmers was another important contribution to progress. Growing in wealth, they were better able to equip and improve their farms. Moreover, they borrowed largely from the East and from Europe.

American agriculture of the nineteenth century was often wasteful. The maintenance of fertility was sadly neglected. On the whole, however, the practices of the farmers in those days were fairly adapted to the circumstances in which they found themselves — to the great abundance of new lands. Partly because their lands were better than those to the east of the Alleghenies and partly because of the new machine methods, the settlers of the West, despite their rudimentary practices, attained far greater output per man than had been

attained by their forbears in the original states of the Union during the early decades of the century. It is safe to say that in the United States as a whole the average output per worker on the soil was at least three times as great at the end of the century as at the beginning. In 1800, although more than four fifths of the people were working on the soil, the country barely produced enough to feed and clothe the population, with a modest surplus for export. By 1900 three eighths of the total number of workers were able both to supply domestic requirements and to export great quantities.

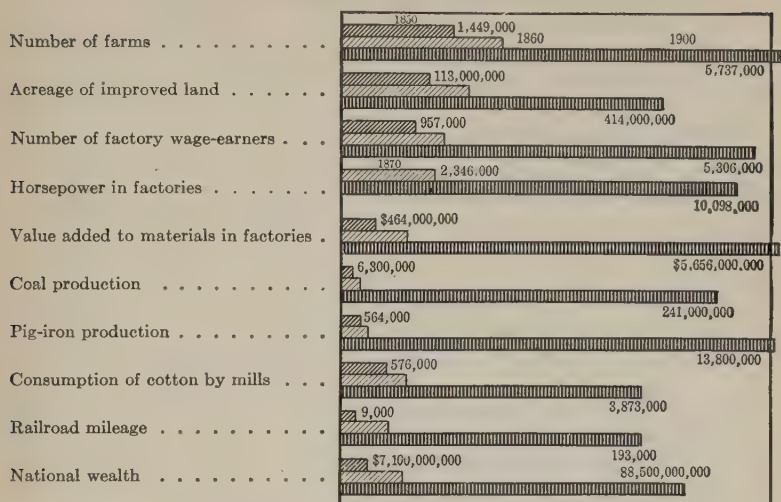
SECTION 2. INDUSTRIAL PROGRESS IN THE NINETEENTH CENTURY

The agricultural progress in the West and South during the nineteenth century made possible industrial progress in the East. Geographical extension of the cultivated area, giving each farm worker more and better land, together with improvement in the methods of farming, permitted America to devote more and more of its workers to the elaboration of commodities and thus to raising the standards of living. The industrial advance was particularly conspicuous after the close of the Civil War.

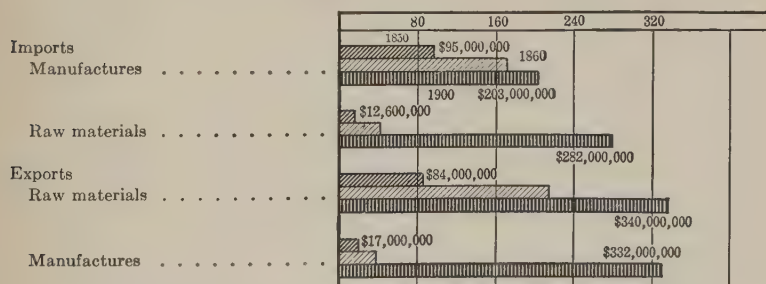
Even before 1850 there had been a considerable development of manufactures and mining. In 1800 the factories had been insignificant — little more than local shops, without the use of mechanical power; by 1850 the factories, in the strict sense of that term and not counting the hand and neighborhood industries, were employing six or seven hundred thousand wage-earners, or about one twelfth of the total gainfully employed workers of the country.¹ The value added to the materials handled was three or four hundred million dollars annually. The major factory products were textiles, chiefly of the simple type, iron and steel and their simpler manufactures, leather and boots and shoes, lumber, and flour and other food products. Mining too had begun

¹ Including hand and neighborhood industries the number was 957,000.

A. AGRICULTURE, INDUSTRY, TRANSPORTATION, AND WEALTH



B. FOREIGN TRADE (SPECIFIED CLASSES), IN MILLIONS OF DOLLARS



C. ECONOMIC CHARACTER OF FOREIGN TRADE, IN PERCENTAGES

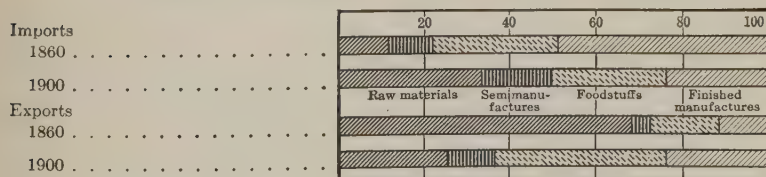


FIG. 6. Diagram showing the growth of industry and foreign commerce during the second half of the nineteenth century

The first part of the diagram makes use of various scales, the actual figures being likewise shown. It gives, so far as available, the data for 1850, 1860, and 1900.

The figures for factories include hand and neighborhood trades

before the middle of the century. Coal had been discovered, and in 1850 about six million tons were produced, mainly in Pennsylvania. Iron-mining had made appreciable progress, chiefly in Eastern districts which have since been mostly superseded by higher-grade ores from the Lake Superior region and Alabama. Over half a million tons of pig iron were being turned out each year. Some lead was being mined, but copper and petroleum had scarcely yet appeared on the horizon.

Naturally the United States, being still predominantly agricultural, remained till after the middle of the century dependent for the most part on importation for such more advanced and costly manufactured goods as its people could afford to buy. Finished manufactures made up over 55 per cent of all imports in 1850. One aspect of American foreign trade in this early period was more satisfactory than it was later on: the bulk of the commerce was carried under the American flag, and Yankee vessels were also doing a large carrying trade for other countries.

Although industry was thus making very real strides, it remains true that the progress of America in the first half of the century was chiefly in agriculture. In its second half, on the other hand, industry shared at least equally with agriculture in the addition to the national income. The East had now set its face definitely toward the mine and the factory. Fed more and more by the West and the South, its industrial population multiplied. The advance in industry was greatest in the North Atlantic states, freed from the drag of slavery and its aftermath.

The population statistics bear witness to the development of the factory (see Fig. 5). New England and the Middle Atlantic division, although adding almost not at all to their cultivated area, increased the number of their inhabitants nearly two and one-half times between 1850 and 1900.¹ Moreover, during the latter decades of the century the East

¹ For states included in the several geographic divisions see map in Chapter VII, Section 1.

North Central section developed a large mining and manufacturing industry. Swift as was the growth of the new agricultural West, these three northeastern divisions still had nearly half the population of the country at the close of the century. The nature of their expansion is indicated by the great growth of the cities. By 1900 no less than 72 per cent of the population in New England, 65 per cent in the Middle Atlantic division, and 45 per cent in the East North Central division dwelt in towns and cities of twenty-five hundred or more inhabitants. That manufacturing industry was rapidly gaining on agriculture is seen by the fact that the population of cities of eight thousand or more (the only basis available for comparison before 1880) increased from 2,900,000 in 1850 to 25,000,000 in 1900, or over eightfold, whereas population in smaller towns and rural districts grew only two and one-half fold in the same period.

Factory industry employed nearly six times more wage-earners at the end of the century than at the middle. The mechanical power used to aid workers increased much faster ; it was more than four times as great in 1900 as thirty years before. Each factory worker had at his hand, on the average, one and one-tenth horsepower in 1870 and one and nine-tenths at the end of the century. The average output per employee increased very materially ; statistics of value of product fail to show a clear picture because of changes in the buying power of money. Older industries had been expanded greatly. In 1900 consumption of cotton by American mills was close to four million bales, four and one-half times as much as forty years before. A noteworthy feature of the cotton-textile industry was its extension into the South Atlantic states, marking the first important step of the South in industrialization. All the well-established industries, moreover, had added much to the variety and quality of their products, catering to an advancing standard of living. Moreover, many new industries had come into being. Industries formerly confined to Europe were transplanted to America, and the progress of science and invention brought

with its industries wholly unknown in earlier times. The tendency everywhere was toward higher elaboration of commodities. The value of vehicles and machinery manufactured in 1900 had reached over \$1,250,000,000, reflecting the large addition to the capital equipment of the nation that was taking place year by year.

One result of the advance in factory industry during the latter half of the century was the relative decline in imports of manufactured goods and the marked growth in exports of them. This class (finished goods) had represented half of all imports just before the Civil War; by the turn of the century the proportion had fallen to one fourth. In the meantime manufactures had risen from 11 per cent to 24 per cent of the total value of exports. The value of finished factory products shipped abroad during the fiscal year 1899-1900 was over nine times greater than four decades before, notwithstanding a fall in the level of prices.

By the end of the nineteenth century American factories had come to rival the farms in economic importance. Although the number of workers employed in them — about five million — was still hardly half as great as the number engaged in agriculture, they were aided by more capital and more power and were creating an output (value added to materials) approximately equal in value.

Transportation advanced quite as markedly as manufactures during the second half of the century. By 1900 the railways had reached four fifths of their present length, though they were still far from possessing their present carrying capacity or actual volume of traffic. The continent had first been spanned soon after the Civil War. Railway mileage (length of line, not of all tracks, the increase in the latter being still greater) had multiplied more than twenty times in fifty years — nearly six times since the close of the Civil War. The efficiency of the railways had greatly improved, and their traffic had grown much faster than their mileage. Meanwhile there had been much development of Great Lakes and coastwise transportation, though that on interior

canals and rivers had been practically at a standstill on account of the invasion of their field by the iron way. Toward the close of the century electric traction had been applied to urban and, to some extent, interurban transportation, and had made enormous strides.

This powerful upswing of manufacturing industry and transportation, as during the earlier decades of the century, was in part the result of natural forces. The opening of rich new farming lands in the West was alone sufficient to give an important impetus to the more elaborative industries. Further rich mineral resources had been brought to light after 1850. Coal had been found in many new areas. Petroleum had been discovered in Pennsylvania and later in neighboring states. The iron deposits of the Lake Superior region and of the South had been brought into use. Copper, lead, and zinc had been found in large quantities. Naturally the utilization of these underground treasures demanded large human contributions also — capital and energy in mining enterprises and in transportation facilities. Mineral production grew by leaps and bounds. The output of coal multiplied forty-fold in half a century and eighteenfold during its last four decades. By 1900 it was three and two-tenths tons for each person in the population. Production of pig iron grew at substantially the same pace; at the end of the century it had reached fourteen million tons per year. By that time the United States was already the world's principal exporter of lead, copper, and zinc, and its petroleum was serving to light homes in every country.

Throughout the entire century man as well as nature played a big part in American progress in industry and transportation. Brawn and will had been active. America had been able to borrow both ideas and money liberally from Europe, especially from England. In that country the last decades of the eighteenth century and the early decades of the nineteenth had witnessed economic development so rapid that this period had gained the name of the Industrial Revolution. The steam engine, the locomotive, and

many kinds of textile, mining, and other machinery had been invented. The Yankee, apt pupil, seized upon these, and in many cases improved them. He himself brought forth much that was new. The steamboat, the cotton gin, the sewing machine, the mower, the reaper, the telegraph, and many other inventions were his work even before the Civil War. During the latter part of the century major inventions and discoveries in machinery and processes came still faster. America was now rivaling Europe as pathfinder of progress. The Bessemer process transformed the iron industry. The telephone, the electric light, and the electric railway came. The typewriter brought new facility to office work. Machinery of many kinds replaced hand methods; often it performed tasks otherwise wholly impossible, and in other cases it greatly economized human effort. Machines previously devised were made bigger, more accurate, and more automatic. Engines of steadily improving efficiency multiplied the quantity of mechanical power.

Thrift was also a major factor in the industrial progress of this period. Important as were loans and investments from Europe, the great bulk of the capital put to work represented savings of Americans themselves. By 1900 even England and Germany had hardly as much capital employed in manufactures and mining as the United States, and no other country had so great an investment in railways. Banks and other financial institutions had been established, in the security of which the people had confidence. Rapid expansion of the corporate form of organization had opened new fields for the investment of savings.

The economic progress of America in the nineteenth century, thus briefly sketched, was very great. In large part it was what might be expected of a new country of very rich natural resources. The growth of agricultural production was fundamentally conditioned by westward expansion, and was in turn a primary cause of the development of the elaborative industries. The latter too owed much to new-found mineral resources. The contribution of purely human

agencies to progress was notable, but what most distinguishes the nineteenth century from the present century is the greater part then played by nature.

SECTION 3. STANDARDS OF LIVING IN THE NINETEENTH CENTURY

What was the effect of this agricultural and industrial development during the nineteenth century on standards of living?

There are no trustworthy estimates of national income before 1900. One must rely on other indicators. Of these the most important is the fact of the large expansion of the elaborative industries, the evidence of which has already been summarized. Standards of living depend on the proportion of goods consumed that rank above necessities. Decade after decade a smaller part of the population sufficed to produce food and agricultural raw materials. Much of the product of the industries manned by the labor thus set free represented betterment of living. Manufacturing industries were constantly adding greater elaboration to materials — making new and finer things for human use and making machinery and equipment to add still further to productive capacity. The great expansion of mining industries likewise meant the contribution of new materials and forces to the well-being of the people. So too the immense growth of traffic on railways and waterways during these hundred years obviously implies advance in standards of living.

The transformation of the United States from an almost purely agricultural nation to one of great industries is the more conclusive as evidence of advance in general well-being because the country at no time sent much of what it produced outside its own borders, or got from outside much of what it consumed. Today Australia is largely devoted to agriculture and stock-raising; nevertheless its standards of living are high because with large exports of the products

of the soil it imports many advanced manufactures. Not so with the America of the early-nineteenth century: it could afford comparatively little from abroad. Annual imports (less reëxports) during the first decade of the century were less than ten dollars per capita, and even lower averages prevailed during several decades that followed.

Again, the advance in the standards of living is indicated by the many things in general use at the end of the century that were unknown at the beginning. Rapid and comfortable travel ranks first in importance — from lumbering stage-coach to whirling Pullman, from storm-tossed and slow sailing vessel to palatial steamer. Instantaneous communication was another conspicuous new convenience; the telegraph came into wide use, and by 1900 approximately two million telephones were already installed. During these hundred years the kerosene lamp and the gas-burner ousted the candle, and they themselves began to give way to the electric light. Stoves and furnaces almost completely banished the picturesque but inconvenient fireplace. Into almost every home the sewing machine came to cut down woman's work. Running water was brought into all city dwellings and into a good many country dwellings. Bathrooms and sanitary toilets became common. Scores of minor household utensils and conveniences quite foreign to the pioneer of early America were brought into general use.

So too there was a great increase in per capita consumption of many commodities which formerly either were the luxury of the few or were used but sparingly by the masses of the people. Among foodstuffs sugar, coffee, chocolate, tropical fruits, and nuts came to be far more largely used than ever before. As late as the sixties the annual consumption of sugar was only about thirty pounds per person; by the close of the century it was in the neighborhood of seventy pounds. As late as 1840 the wholesale value of silk goods used (they were then practically all imported) was less than half a dollar per capita; at the end of the century it was more than three times that. Of garments of cotton and

wool, of boots and shoes and hats, the common man and woman had much larger store and much finer quality at the end of the century than at the beginning. Factory methods brought much better and more attractive furniture within reach of the masses.

The general improvement in the situation of the rank and file of the population was evidenced further by advance in wage rates. The data as to money wages are somewhat difficult to interpret because retail prices and other costs of living at different periods cannot be accurately compared. Records of wholesale prices and other available information, however, make it probable that the cost of living for typical factory workers and artisans in the Eastern states was lower toward the close of the century than during its early years. Beyond a doubt wholesale prices had fallen decidedly. Meantime money wages had risen greatly. During the first quarter of the century prevailing wages of skilled men in the building trades, for example, even in the more thickly settled sections along the northern seaboard, were but little more than a dollar a day. This was for ten hours or more (usually more) of work. Wages in the building trades are fairly typical of those in other skilled occupations. Common labor earned much less. Farm hands in Massachusetts about 1800 got only fifty cents a day without board. In 1812 laborers building a road in western New York received only forty-six cents daily. An early investigation reached the conclusion that the average daily wage of unskilled workers in the principal cities in 1805 was seventy-five cents.¹

At the close of the century money wages were three or four times higher than those just cited. The prevailing wage of skilled workers in Eastern cities was from three to four dollars per day; the unskilled earned about two dollars. In the East farm hands working the year round, if without board, received about \$30 per month; their cost of living, however, was much lower than in the cities.

¹ All the data given above have been collected by Victor S. Clark, in "History of Manufactures in the United States," Vol. I, pp. 390-393.

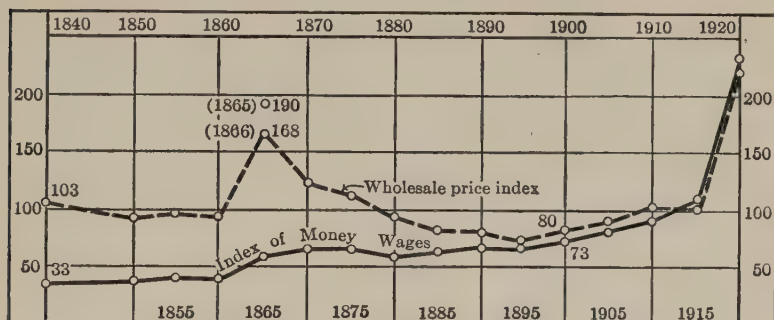
From 1840 on, records of wages become more abundant than theretofore. Indeed, a general index has been constructed running back to that time. Although this is subject to a considerable margin of error, the advance shown is far too great to be attributed in any material part to defective data.¹ In Fig. 7 the general wholesale-price index is also shown as a very rough indication of the trend in buying power of the money earned by the workers. The wage index stood (on the basis of 1913 wages taken as 100) at approximately 33 in 1840 and at 73 in 1900, an advance of about 120 per cent. Wholesale prices, on the other hand, were more than 20 per cent lower in the latter year. The increase in real wages had certainly been very great. It may be noted that the sharp advance both in wages and in prices during the Civil War was due to paper-money inflation. Afterwards, just as after the World War, money wages fell but little, whereas with the deflation of credit and currency the prices of commodities declined rapidly. The great advance in money wages between 1840 and the close of the century is confirmed by comparisons for individual trades (see Fig. 7, *B*).

From our present standards women's wages in the early-nineteenth-century textile factories seem unbelievably low, usually only from two to three dollars per week. As late as the forties their wages were from three and a half cents per hour to five and a half cents; this meant from about \$2.25 to \$3.75 per week. By 1900, on the other hand, hourly wages for women in Massachusetts textile factories had reached from ten to fifteen cents.

The prevailing workday for labor was considerably shortened during the course of the century. Down at least to 1850 from eleven to thirteen hours per day was the customary period of work both in hand trades and in factories; the

¹ This index is constructed by the United States Bureau of Labor Statistics. For earlier years it follows the investigation made during the nineties under the direction of a special committee of the Senate — the so-called Aldrich report. See the *Monthly Labor Review* for February, 1921.

**A. INDEXES OF AVERAGE MONEY WAGES AND WHOLESALE PRICES
AT FIVE-YEAR INTERVALS (1913 AS 100)**



B. COMPARATIVE RATES OF WAGES, IN CENTS PER HOUR

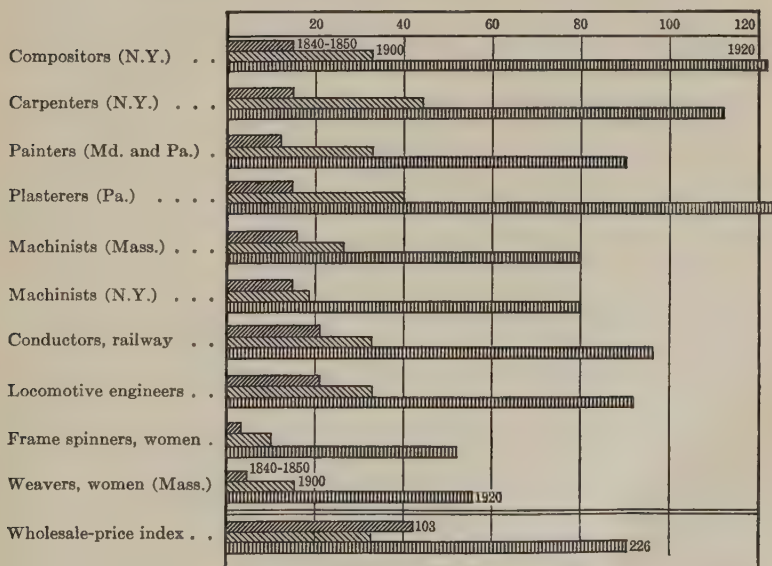


FIG. 7. Diagram showing the advance in wages during the nineteenth century

Section *A* presents an index compiled by the United States Department of Labor (approximate only) representing all branches of industry; for a rough indication of the buying power of wages the general wholesale-price index is also shown. Section *B* compares money wages in various trades. The first bar represents some year between 1840 and 1850 (with one or two exceptions falling in the following decade); the second bar represents 1900 and the third 1920. The rates are not all strictly comparable

ten-hour day was a rarity. At the end of the century a predominant proportion of the workers in factories and mines had the ten-hour day, and in the building and printing trades and a few others the nine-hour day had already become common. By 1909, when the census collected the first comprehensive statistics of hours of labor in factories, the average for all the workers was fifty-seven hours per week, or nine and a half hours per day.

The evidence of marked improvement in the situation of the wage-earner is thus clear. As for the farmers, improvement may be reasonably inferred both from the advance in the wages of other workers and from the fact that the quantity of products turned out by each farmer greatly increased. There were considerable periods of time, to be sure, when an unduly rapid increase of cultivated area brought prices of farm products to very low levels. Many of the settlers of the West were concerned more with anticipated advance in the value of lands, which they got for nothing or very little, than with the immediate returns of cultivation. They underwent hardships because of rosy hopes for the future. In many cases these hopes were not realized during their lifetime, sometimes not during that of their children. It was not till almost the end of the century that the strong and steady upward swing of land values began. Nevertheless there was, on the whole, a very real gain in living conditions as generation followed generation. In the early years of the century the sheer inaccessibility of most of the farms largely cut the farmers off even from the commodities and services they might have been able to afford. The farming community, with its little village center, had to be almost completely self-sufficing, and it did not possess the facilities to provide much variety of goods. By the end of the century nearly all the farms had ready access to the railroad and, through it, to factory products.

One very significant advance in the standards of farm life was the extension of public schools. In the early days a large proportion of farm families were so scattered that

school attendance was impossible. Where public schools were maintained in rural districts they were open only three or four or five months in the year. By 1900 farm children very generally had the benefit of schooling. In the primarily agricultural states of the Northwest, for example, about four fifths of all children between the ages of five and seventeen were enrolled in schools, and most even of the rural schools were open six months or more of the year.

It must not be supposed that economic progress in the United States during the nineteenth century was unbroken. There were a number of severe industrial depressions. The Civil War did grave damage; in particular it greatly set back the progress of the South. At several periods, and especially toward the close of the century, unduly rapid immigration overcrowded certain industries and checked the advance in wages. Fluctuations in the supply of precious metals, as well as changes in the currency policy of the government, caused ups and downs of prices that worked wrong now to creditors, now to debtors. Wages tend to lag behind prices when the value of currency varies, and at times American wage-earners during the nineteenth century suffered on that account. There appears to have been a slight decline in real wages between 1890 and 1900.

From about 1880 to 1895 the American farmers very generally complained of their lot. New lands in the West had been hurried into use beyond need. Competition from Canada, Australia, and Argentina was beginning to be felt in world markets. Prices of farm products fell relatively to prices of other products. The general fall in prices in any case would have hurt the farming class, many of whom were hampered by debts contracted when the commodities they produced brought more per unit. To some extent cultivation had been pushed into semiarid regions, and frequent crop failures there added to distress. However, during the last few years of the century the farm situation took a decided turn for the better, the beginning of an upswing that continued till the end of the World War.

SECTION 4. GENERAL NATURE OF RECENT ECONOMIC PROGRESS

The economic progress of the United States has continued without abatement down to the present day. Indeed, during much of the time since about 1895 the pace has been more rapid than during the last decade or two preceding that year, when falling prices had discouraged business. The method of advance during the last thirty years or so has been more in the intensification of productivity than in geographic expansion, though the latter has continued in no small measure. Growth in population has been less rapid than before, as is natural in a more settled country. The increase in output per capita and the advance in standards of living have been very marked, more marked perhaps than during any previous period of equal length in American history.

From 1900 to 1910 the population of the United States increased 21 per cent, during the next decade 15 per cent, and since 1920 at substantially the same rate.¹ During the nineteenth century the rates of increase by decades down to 1890 had ranged from 25 per cent to 36 per cent. The census of 1930 is expected to show a gain over 1900 of about 60 per cent; in the last thirty years of the nineteenth century the increase was a little over 90 per cent.²

Before 1900 the rate of growth had been much faster in the West than in the East. During the present century the primarily industrial divisions — the three northeastern and the South Atlantic — have accounted for over three fifths of the total absolute addition to numbers. The pace of their growth (about 54 per cent in the quarter-century ending 1925) has been but little slower than that of the less densely

¹ Population figures since 1920 are estimates of the Bureau of the Census and, especially those by sections of the country, subject to an appreciable margin of error. For states comprised in the several geographic divisions see map in Chapter VII, Section 1.

² Adjusting for under-enumeration in the South in 1870; without such adjustment the increase appears as nearly 100 per cent.

settled West and South. The greatest agricultural region of the country, the West North Central, which still possesses over one third of the total crop land, has gained relatively less in population than any other section except the East South Central: its increase amounted to only 26 per cent in the first twenty-five years of this century as contrasted with 68 per cent in the twenty years from 1880 to 1900. The Mountain and Pacific states, starting out with small numbers at the beginning of the century, naturally show high percentage gains in population. They still, however, have less than one tenth of the national total. Moreover, their growth has represented industrial and commercial development almost if not quite as much as agricultural, which was by no means true of the new regions settled during the previous century. Much of the land of the Far West is too dry for satisfactory tillage, and some of the farms opened under the stimulus of the World War demand have since been abandoned.

Statistics of rural population and of agricultural land emphasize the marked change that has taken place in the direction of American economic development. Urban growth has always outstripped rural, but never before by such a lead as during recent years. In the last twenty years of the nineteenth century rural population (that outside incorporated places, regardless of size) increased about 20 per cent and urban population about 110 per cent. The corresponding ratios for the period from 1900 to 1925 were about 10 per cent and 100 per cent respectively. Indeed, the best available estimates indicate that the number of persons actually engaged in agriculture (which has fallen materially since the 1920 census) is somewhat less today than at the beginning of the century. This does not mean that agricultural production is stationary. Acreage under cultivation has increased considerably, although much less rapidly than before. Output has increased much more: in fact, by about 60 per cent since 1900. It is chiefly man's contributions of knowledge and of capital that have brought

about the progress of agriculture in the United States during the last thirty years.

The opening of new Western lands has thus ceased to be a factor of dominant importance in American progress. Nor can it be said that new discoveries of minerals have played a major part in the recent decades. Relatively little has been added to the known areas of coal, the most important gift of the mine, nor to those of iron, lead, and zinc. New oil fields and copper deposits of great richness have been found, but the larger part of the rapid growth of mineral production has been due to more intense development. Here, as in agriculture, human rather than natural agencies have been dominant during the present century.

American manufacturing industries have expanded greatly during the last three decades. Down to 1920 the increase in the number of wage-earners in the factories was substantially as rapid as at any period since trustworthy statistics began. Output meanwhile increased considerably more than the number employed. Since 1920 there has appeared the altogether new phenomenon of a slow decline in the number of factory workers; but, despite this, output has increased markedly. Equally rapid has been the development of transportation and of commerce since 1900. Growing efficiency in all industries and activities has built up total national production and raised standards of living.

Such economic progress as has been made during the present century the American people owe largely to their own industry, enterprise, ingenuity, and thrift. The start which unusually rich and expanding resources had already given them was, to be sure, an immense help. It is easier to rise from an already high plane than from a low one. But nature has not been showering the people with new gifts in any such fashion as during the earlier history of the country; they have been thrown more and more upon their own capacities.

SECTION 5. THE INCREASE IN PRODUCTION SINCE 1900

General Indexes

The most comprehensive statistical measure of the economic progress of recent decades in the United States is afforded by general indexes of the volume of output in the major branches of industry. From about 1900 the current censuses and other official statistics furnish a great mass of data as to production of goods and services. The returns are not sufficient to make possible a mathematically precise calculation of the changes in aggregate output; but so large are the increases in production revealed that the possible margin of error could not materially affect the general conclusions, and there is much reason to believe that such error as exists is in the direction of understatement.¹ The statistics are summarized in Fig. 8 (p. 65).

¹The task of comparing output of the branches of industry at different times would be relatively simple had there been no change in the general buying power of money. Statistics of value of products are much more complete, especially in the case of the manufacturing industry, the largest single branch, than those of quantities produced. A rough measure of the quantitative changes may be reached by adjusting the reported values according to the wholesale-price index, but that index, based necessarily on a limited number of samples mostly in the nature of staple commodities, can scarcely be trusted to reflect closely the changes in prices of all classes of goods. The calculations for the four branches of industry as presented in Fig. 8 are made by determining the percentage of increase in the quantity of each individual commodity for which data are available and combining these into averages weighted according to the relative importance (as determined by value) of the individual articles, or of the classes of which they are assumed to be representative. Some difficulty is involved in fixing proper weights for the purpose of such combination. The chief difficulty, however, lies in the fact that for many commodities, especially factory products, there are no statistics of quantity produced, this lack being due to the absence of standard comparable units. It is probable that the output of such unstandardized products has increased even faster than that of those for which quantities are available.

A certain amount of estimate is involved also in the calculations of the changes in the number of workers in the several branches of industry, either because up-to-date returns do not exist or because of certain changes in census methods and definitions which affect the comparability of the data. In this respect, as in the case of the figures regarding quantity of output, the diagram represents the best judgment of a number of careful and conscientious statis-

These calculations show an altogether remarkable increase in the output of the farms, mines, factories, and railways during a little more than a quarter of a century. As against an addition of about 58 per cent to the number of inhabitants between 1899 and 1927, the production of the farms increased about 56 per cent, that of the factories about 180 per cent, that of railway service nearly 210 per cent, and that of the mines, under the domination of the enormous growth in petroleum production, over 280 per cent.

The differences between the several branches of industry in increase of output are highly significant. The fact that agriculture shows the least expansion is by no means evidence of inefficiency of the farmers, nor is the relative movement away from the farms a matter for lament. In the nature of things, demand for farm products can expand but little when once the people have enough to eat and to wear. The output of the farms has substantially kept pace with the growth of population. Inasmuch as the farmers, with their advancing efficiency, could meet demands without adding to their numbers, the country has been able to turn the annual additions to its working forces into other industries — industries which supply more advanced wants or which create capital goods for still further swelling of national production. The fact that output in other fields has outstripped that of agriculture is an evidence of progress in agriculture itself.

In each of the four branches shown the gain in output since the beginning of the century has far exceeded the growth

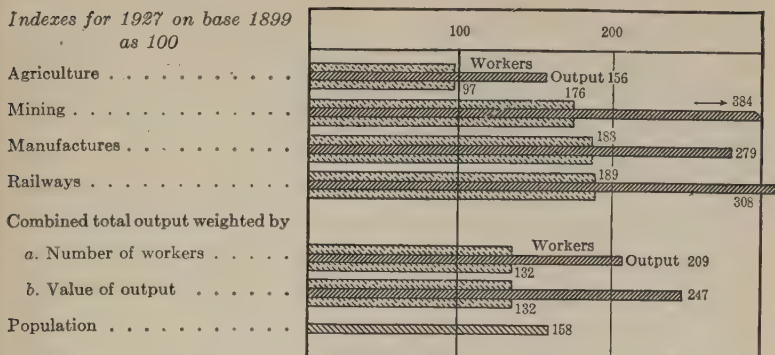
ticians. The resulting picture of the progress of industry is probably as close an approximation as the nature of the original material available will permit.

The data in the diagram represent, in the case of manufactures, the census years 1899, 1919, and 1927. For the three other branches averages for the years 1898-1900, and 1918-1920, respectively, have been used in order to eliminate the effect of casual variations in output. The single year 1927 is fairly typical of the last two or three years.

The calculations here presented are in part the work of the present writer, those for manufactures are by E. E. Day and Woodlief Thomas, and those for agricultural output chiefly by Mordecai Ezekiel and L. H. Bean. The calculations, revised from year to year, are published in the *Commerce Yearbook*, Volume I.

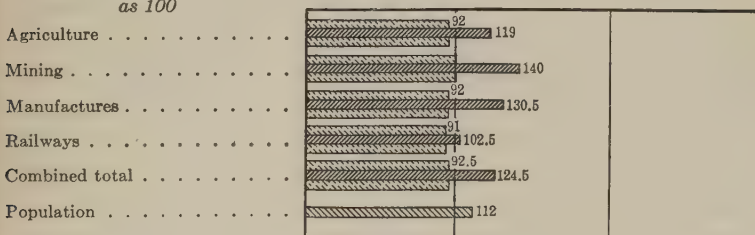
A. NUMBER OF WORKERS AND QUANTITY OF OUTPUT

Indexes for 1927 on base 1899
as 100

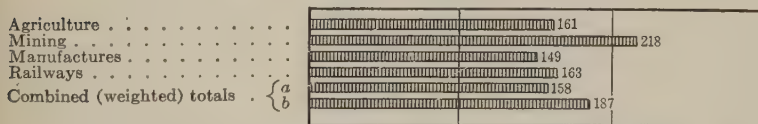


B. NUMBER OF WORKERS AND QUANTITY OF OUTPUT

Indexes for 1927 on base 1919
as 100



C. OUTPUT PER WORKER IN 1927, ON BASE 1899 AS 100



D. OUTPUT PER WORKER IN 1927, ON BASE 1919 AS 100

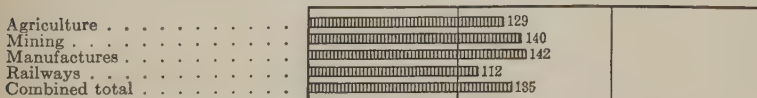


FIG. 8. Diagram showing comparative increase in number of workers and quantity of output in major branches of industry

This diagram shows, for example, that in agriculture the number of workers in 1927 was about 98 per cent of the number in 1899 (that is, a decrease of 2 per cent), and that the output of the farms was about 156 per cent of the 1899 output. *C* and *D* are derived from *A* and *B*, respectively, and show the increase in output per worker.

As to the trustworthiness of the data see discussion in text

in the number of workers. By reason of greater use of capital and other aids, invention of better machinery and processes, better management, and more intelligent work, there has been an immense gain in efficiency in every field. The increase in output per worker in agriculture, manufactures, and railway transportation ranges (roughly) from 50 to 60 per cent. The much higher percentage for the mining group is due to the fact that expansion has been especially conspicuous in the petroleum industry, in which, because of the generosity of nature and the great use of capital, the output per worker, in terms of value, is very high.¹

A general average showing the combined change in output for the four branches of industry taken together involves the assignment to each branch of a weight reflecting its economic importance. If the branches are weighted according to the number of persons engaged in them (at the beginning of the period), the combined increase in production between 1899 and 1927 appears as about 109 per cent. Since the actual number of workers increased only 32 per cent, the average gain in output per worker, calculated on this basis, would be approximately 58 per cent.

Another method of making the combined average, and in principle a more appropriate one, is to assign to each branch of industry a weight corresponding to the value of its output. The importance of an industry depends not only on the number of workers but also on the amount and character of the capital employed, the extent to which natural forces contribute, and the skill of management and of labor. All these factors are reflected in the value created. If in a given branch, by reason of differences in these respects, the output is large in proportion to the number of workers, it is an advantage to the community to shift workers into this

¹ For all mining industries except petroleum the increase in production per worker has been about 60 per cent, and for the petroleum industry itself the gain has been only about the same; but the relative shift from other mining to that of petroleum, with its larger output per person, brings up the combined average for the branch as a whole to the figure shown.

branch from those where output per man is smaller. According to the figures ordinarily taken as representing the value created by the great branches of industry, the average per person is much lower in agriculture than in mining, manufactures, or railway transportation. Although the disparity is probably exaggerated by these statistics, it no doubt actually exists in some measure. Since 1900 there has been no increase (if anything, a slight decrease) in the number of workers on the farms, whereas the number in those industries which produce more per man has increased decidedly. Consequently an average weighted according to value of product shows a greater gain in total output, and in output per man, for the four branches under consideration combined, than one weighted according to the number of workers. If the values are used without any attempt at refinement, the weighted average increase in output from 1899 to 1927 appears as no less than 147 per cent, and that in output per man as 87 per cent. These high ratios may represent a certain exaggeration, but there can be little question that the true gain in the productivity of American industry as a whole is appreciably greater than appears from the averages weighted according to the number employed.¹

¹ Certain reasons for considering the figures of values used in the weighted average as not altogether trustworthy may be mentioned. The weight used for manufactures is the "value added to cost of materials by manufacture" as reported by the census of 1899. This somewhat overstates the true contribution of the factories, because certain payments to outside groups, such as rent, insurance, and repairs, are not deducted. On the other hand, the weight used for agriculture represents the sum of the reported (or estimated) values of the several individual products, deducting only the value of crops fed to farm animals. Although there should, strictly speaking, be further deductions for seed, fertilizers, and other items, it is nevertheless possible that this figure is an understatement of the true value produced by farms, because of omission or undervaluation of certain items (notably products of the farm consumed by the farm family itself), and because it fails to take account of the fact that the farmer has the use of a house and, if he be the owner, the advantage of needing less life insurance than the city worker who has no such property.

It should be noted, as supporting the method of weighting the several branches according to value of output, that, if accurate, it would give results similar to those obtained by disregarding branches of industry and assigning to each separate commodity or service a weight corresponding to its value.

In proportion to the population of the country there is today a much larger output of farm, mine, and factory products and of transport service than at the beginning of the century. Comparing the increase of 58 per cent in the number of inhabitants with even the lower figure of 109 per cent — the average increase in output based on a weighting according to number of workers — we have an addition of one third to the production per capita of the entire population. If we use the larger figure of 147 per cent for increase in output, the per capita addition appears as over 55 per cent.

It is essential not to misunderstand the significance of the increase in product per person employed. Land, capital, and management contribute to output just as truly as labor does. Increase in production per worker is not synonymous with increase in productivity of labor. With their advance in education and skill and with a better attitude toward their work, the farmer, the mechanic, and the factory operative have undoubtedly become much more efficient. Their own hands and brains produce more than before. But scientific research, better organization, superior management, and greater use of machinery and other forms of capital also play a large part in adding to production. Obviously, however, the combined effect of all the contributing factors can be measured best by calculating the averages per person employed. Not only is this a convenient procedure, but the averages possess profound economic and social significance. Whatever causes add to output per worker, society as a whole gains. Broadly speaking, the addition means more pay for wage-earners, more goods for consumers, and a general advance in standards of living.

The growth of production is the more significant in view of the shortening of the working day which has taken place. The first general census statistics of hours of labor in factories were collected in 1909. Between that year and 1923 (see Fig. 4; there are no later census data, but some further reduction has occurred since 1923) the average number of hours of work per week in the factories was reduced by

11 per cent. Between 1916 and 1927 the hours of railway employees were diminished by more than one sixth. There had been, moreover, some lessening of hours during the early years of the century. It is quite probable that on the average the working day is 15 per cent shorter at present than twenty-five or thirty years ago. The output per man-hour has therefore increased at rates correspondingly greater than those shown in the diagram.

The Shift in Occupations since 1900

The advance in American standards of living is not to be judged merely from the per capita output of the goods and services produced by farms, mines, factories, and railways. There are many other services which count in the life of the people. The volume of these has increased faster than the output in the branches for which statistics are available. This is indicated by the fact that, whereas the population of the country increased about 58 per cent between 1899 and 1927, the number employed in the four branches here considered rose by only about 32 per cent. There has been a shift into other occupations. This movement is not fully revealed by the available statistics of occupations; the latest year to which these relate is 1920, and the shift has been far more marked since that time than before. As is more fully pointed out in Chapter VI, there is a constant tendency for workers to move from occupations producing the more necessary goods and services to those producing the less necessary. The total number of persons working for a livelihood constitutes substantially the same proportion of the population at the present time as in 1900. Although the number of women working outside the home tends to increase, there has been, on the other hand, a great addition to the number of children and young persons attending schools and higher institutions of learning, which just about offsets this movement. The withdrawal of the younger generation from industry represents an advance in standards of living. The

use of their time for education may be considered one of the forms of consumption which larger output of industry has made possible in greater measure. The number of students in high schools, normal schools, colleges, and universities increased from about 950,000 in 1900 to nearly 5,500,000 at present (Fig. 9).

Other Indicators of Expanding Business

Apart from the general indexes of production in the major branches of industry, there are a great many more detailed evidences that since the close of the last century the United States has increased its output of goods and services very greatly. Some of these are capable of statistical measurement, and a number of the most important are shown in Fig. 9.

In comparison with an increase of less than three fifths in population, the horsepower used to aid the workers in American factories has nearly quadrupled since 1899, one of the important proximate causes of the great increase in production of manufactured goods. The railways are carrying three and one-third times as much freight as at the close of the nineteenth century. Production of coal, the chief source of the energy which multiplies man's strength, has much more than doubled, and that of petroleum, the second source of energy in importance, has increased nearly sixteen times. Steel production, which, by reason of the growing stock of old material available for remelting, is a more significant indicator than pig-iron production, has increased about 385 per cent, reflecting an immense increase in output of machinery, vehicles, and other forms of capital. Even in the oldest of the major factory industries, that of cotton goods, production has nearly doubled, and this despite the tendency to use far less cloth in a given garment.

In the case of many important commodities the gains in production since the end of the last century have been far more marked than those shown in the diagram. They are

RELATIVE NUMBERS, ON BASE 1899 OR 1900 AS 100

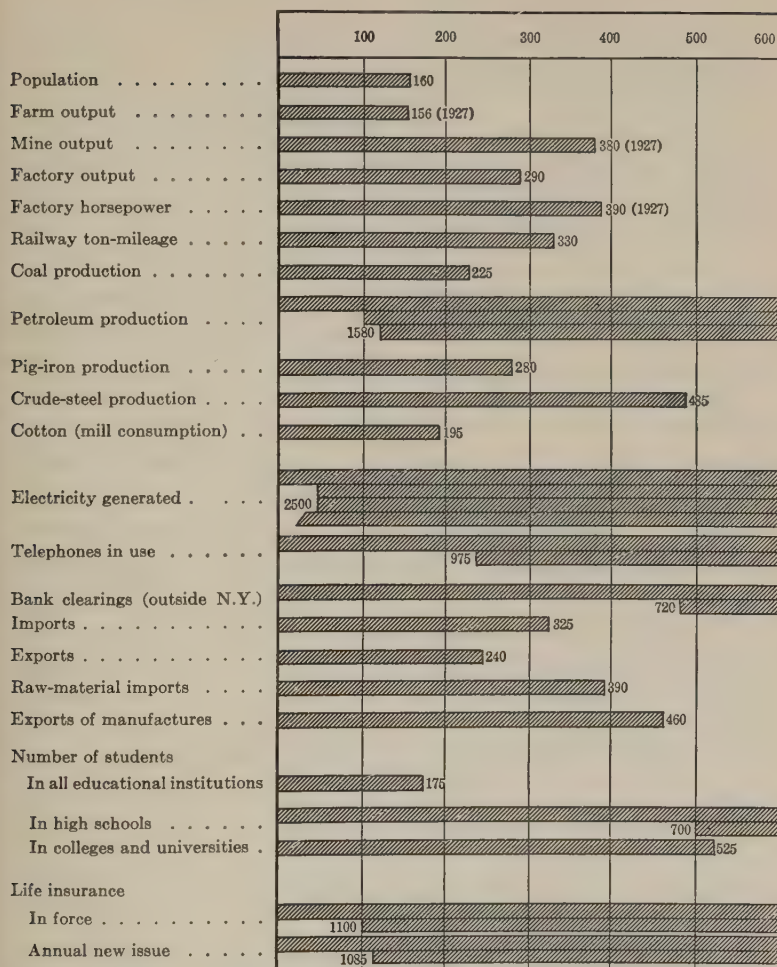


FIG. 9. Diagram showing indicators of economic progress since the close of the nineteenth century

The bars represent relative numbers for 1928 (in some cases 1927) as compared with 1899 (in a few cases 1900) taken as 100. It shows, for example, that the population in 1928 was 160 per cent of that twenty-nine years before. In a few cases the data are averages of two or three years, where a single year is not typical. The bars representing bank clearings and life insurance exaggerate the effective increase, since they are not adjusted for the decline in the buying power of money (about 40 per cent since 1899). The foreign-trade statistics are adjusted (roughly) for this change

omitted from it either because of a lack of specific statistics or because they are new things unknown at the beginning of the period or with output then so small that the percentages of increase are too great to be represented. The most conspicuous of these new products is the automobile. From one or two thousand per year at the beginning of the century the number turned out annually now exceeds four million, and represents about one twelfth of the total value of manufactures. A bewildering variety of new electrical machinery and apparatus has sprung forth; the value of the annual production of this branch of manufacture has multiplied about eighteen times since 1899. The output of such devices as typewriters, adding and calculating machines, and cash registers has become many times greater. Taking all classes of machinery together, we find that the value turned out in 1927 was about six times more than in 1899, and probably not over a third of the increase was due to advance in price levels. Merely to list the new commodities added to the product of American factories since the turn of the century would require many pages.

The most striking of the figures illustrated in the diagram (Fig. 9) are those of the electric current generated. Although in a certain measure this immense expansion represents substitution for other forms of power and of light, much the greater part represents addition to the quantity of power and of light used by the people. Very remarkable too has been the expansion in the use of telephones, reflecting both more efficient methods of transacting business and advance in standards of living.

The volume of bank transactions has increased greatly in recent decades, and this fact (especially when the figures for New York City are excluded) reflects general growth of production and trade. Even allowing for the fall in the value of currency, the increase in bank clearings outside New York since 1900 is of the order of four or possibly five fold, notwithstanding the fact that consolidation of banks has tended to reduce the necessity of clearing transactions between banks.

The growth of the foreign trade of the United States is also an evidence of an increase of production and consumption. We shall see in Chapter XII that exports constitute hardly a larger proportion of the production of commodities at present than at the beginning of the century. The proportion of imported goods in the consumption of the people has perhaps risen somewhat. Both proportions are relatively small. It is all the more significant, therefore, that exports, adjusted roughly for the change in price levels, are now nearly two and a half times larger than at the close of the nineteenth century, and that imports are three and a quarter times larger. The development of American factory industry is reflected by the growth in imports of raw materials and in exports of finished manufactured products, which has been far greater than the increase in total imports or total exports.

It is superfluous to pile up further statistical details. The broad picture of recent decades has been made sufficiently clear. During the short space of time since 1900 the national output of goods and services has doubled or trebled. The country has added about three fifths to its population, and for each person in the population the annual production has increased by much more than half. And the advance has been due in large measure to the character and the efforts of the American people. Progress has been most conspicuous in those fields where nature contributes only in moderate part to aid the human hand and brain.

SECTION 6. THE TWENTIETH-CENTURY ADVANCE IN STANDARDS OF LIVING

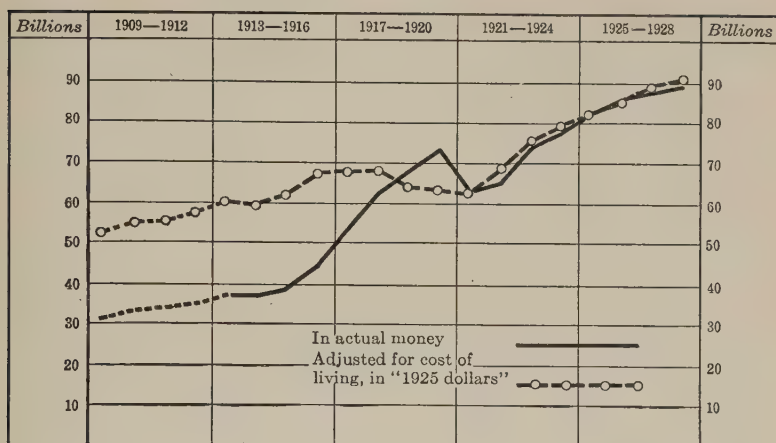
The great increase in production during recent decades has brought with it a marked advance in standards of living. Production and consumption for the most part go hand in hand. The great bulk of what is produced in the country is consumed directly by its people, and much of the remainder is exchanged for foreign goods which in turn are consumed by them. A considerable amount of what is

produced is, to be sure, set aside for capital to increase future output, but the proportion of the total value of goods and services thus applied is hardly more than one tenth. Most classes of commodities are by their very nature consumption goods, whether of a kind quickly used up, like food, or of a more enduring form, like houses, passenger automobiles, and furniture. Moreover, nearly all the incorporeal services, to which a larger and larger proportion of the energy of the country has been devoted, serve human wants directly: their production and "consumption" are one and the same thing. Pretty much all that has been said in the preceding section regarding production of goods and services, therefore, is direct evidence of advance in per capita consumption, of rise in standards of living.

Increase of production is the same thing as increase in the income of the people. There are no careful calculations of national income earlier than 1909, but even during the nineteen years between that time and 1928 the total income of the United States in terms of "1925 dollars," according to what are generally considered the best estimates, rose from about \$53,000,000,000 to \$93,000,000,000, and the average per capita from about \$590 to about \$770.¹ Since the beginning of the century the advance in per capita income has probably not been far from 60 per cent. According to the estimates of the Bureau of the Census (extended since 1922 by the National Industrial Conference Board, a private

¹ The annual income estimates are shown in Fig. 10. The basis of the diagram is the recently revised estimates of the Bureau of Economic Research published in the report on Recent Economic Changes (McGraw-Hill, 1929). These show income in "current dollars" for 1913 to 1928, and in "1925 dollars" down to 1926. The writer has carried the figures back to 1909 by use (with adjustment to correspond with the revised total for 1913) of estimates previously published by the same Bureau, and has calculated the income of 1927 and 1928 in "1925 dollars" according to the changes in the index of cost of living published by the Bureau of Labor Statistics. In the statement made in the text above about \$2,000,000,000 has been added to the income of 1928 to cover profits of corporations not distributed to stockholders (see footnote on page 9). No such addition has been made in the diagram because data as to such undistributed profits are not available for all years.

A. NATIONAL INCOME, IN BILLIONS OF DOLLARS



B. AVERAGE INCOME PER CAPITA, IN DOLLARS

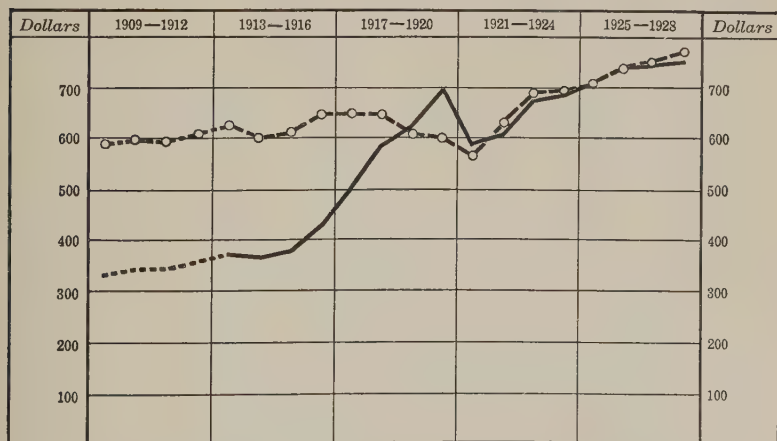


FIG. 10. Diagram showing recent changes in the estimated national income of the United States

These estimates are compiled by the National Bureau of Economic Research; the adjustments (down to 1926) for changes in the cost of living are made according to a special index prepared by that bureau, in terms of dollars of the buying power of 1925. Further explanations regarding the method of computing the data are given in the footnote on the preceding page

organization) the wealth of the country has risen from \$88,000,000,000 to about \$350,000,000,000, or from about \$1160 to \$2900 per capita. Allowing for changes in the buying power of money, wealth per capita has increased at least 50 per cent.

The great increase in consumption of commodities has not prevented accumulation of savings, with the safeguard which they afford to the family. All forms of savings show great growth during recent decades, and especially since the war. Between 1910 (the first year covered) and 1928 savings deposits and other time deposits in American banks more than quadrupled; allowing for the fall in the value of currency, they approximately trebled. The amount of life-insurance policies in force at present is about eleven times as great as at the beginning of the century (see Fig. 9). Building and loan associations have multiplied eight or nine times in membership and much more in volume of business. The corporate form of ownership has expanded enormously, and great numbers of the population have become shareholders.¹

One of the most significant evidences of the advance in general well-being is the increase in attendance at schools, colleges, and universities. This reflects larger income of the people in the ability both to spend more money for education and to spare more of the time of children and young persons from work for the family support. The average number of days of attendance per year per pupil in the public schools has increased about 37 per cent since 1900, and the proportion of such pupils to the total number of children of school age has risen from 69 per cent to 80 per cent. The great growth in the high schools and colleges has already been mentioned (see Fig. 9). Of the boys and girls of high-school age in the country as a whole less than one eighth were actually in the high schools at the beginning of the century. The proportion is now two out of five.²

¹ The growth of savings is discussed further in Chapter V, Section 3.

² Further facts regarding the growth of education are given in Chapter V, Section 1.

The only important question that can be raised as to the advance in the standards of living concerns the distribution of the gain among the classes of the community. How far have wage-earners, farmers, small-scale storekeepers, and professional workers shared in it? To enter into a detailed discussion of this subject lies outside the scope of a volume such as this. It is easy enough to demonstrate that the lot of the "common man" in America is better today than it was a quarter of a century ago or a decade ago; how his gain compares with that of the rich or of the so-called "middle classes" is, of course, not so certain. There exist no general statistics of incomes classified by economic groups or by size groups. Statistics of changes in real wages and earnings, as distinguished from nominal (or money) wages and earnings, are imperfect. Discussions of changes in income of different classes of the community must inevitably involve much estimate and assumption, and no two investigators, even though unprejudiced, will reach closely similar conclusions. It is worth while, however, to summarize certain facts which indicate that the masses of the people have gained in an important measure from the recent progress of American industry. The presentation of these facts involves no implication with respect to the measure of justice in the distribution of wealth and income.

1. The present high standards of living of the wage-earners and other classes making up the mass of the population (already shown in Chapter I) must of necessity have been gained in part during the last few decades. If the great increment of national production which has taken place during that period had mostly gone to the few, well-being could not be so widely diffused today as in fact it is.

2. The immense addition to national production could not have found a market unless a great fraction of it had gone to the working classes. The bulk of the production consists of consumption goods and services. A small fraction of the population could not possibly have absorbed the larger part of the added output.

3. There has been such a multiplication of the number of units of very many individual commodities and services that only much larger use of them by great bodies of people could account for the gain. The rich man does not want an indefinite number of units; his demand is for finer things rather than merely for more things. The case of the automobile is an illustration no less significant because it is so obvious. The majority of American families now possess this convenience, which was practically unknown a quarter of a century ago. They would not have devoted so much of their income to buying and operating motor cars if they had been compelled thereby to cut down other forms of consumption. The great numbers of homes into which within two or three decades the electric light and the telephone have entered bear similar testimony to widespread advance in standards of living. Common observation shows that dwellings built in the cities and towns during recent years are on the average of higher grade than those erected twenty or thirty years ago, and the numbers built have been so enormous that only because a great part of them went to wage-earners could they have been sold at all. So too the great growth in the patronage of places of amusement evidently means that the masses frequent them far more than formerly. The extraordinary multiplication of periodicals shows both increase in the purchase of these by the common people and advance in the power of such people to buy the goods advertised in them. The immense increase in that highly desirable form of "consumption," school attendance, especially in high schools, has obviously been largely on the part of the children of the wage-earner and the farmer.

4. The share of the total receipts of certain major branches of business which goes to the working class has remained constant or risen at the same time that those receipts have increased greatly. It is true that in the factories the ratio of the wages paid to the "value added to materials by manufacture" was somewhat lower in 1927 than in 1899; but if we take into consideration the pay not only of wage-earners

but also of salaried persons, a great proportion of whom are on substantially the same economic level, the proportion rose from 49 per cent to 51 per cent.¹ One is justified in assuming from these ratios that a large fraction of the increase in output of manufacturing industry went to the workers. Whereas wages and salaries formed 39 per cent of the gross receipts of the railways at the beginning of the century, the proportion has now risen to about 47 per cent.

5. There has been a great advance in the money income of wage-earners during the past three decades, and the available information regarding the cost of living, though very imperfect, proves that this has risen much less, so that the real income of the workers has increased materially. The advance in money income appears in data both as to wage rates and as to earnings, the latter being affected by the degree of continuity of employment as well as by the rates of pay. It appears somewhat more conspicuous when wages are expressed on an hourly basis than when calculated by the day, week, or year, for the reason that the working day has been materially shortened.

Several series of statistics regarding money wages and earnings are shown in Fig. 11.² They are all from official national or state sources except the series of hourly factory earnings, which is compiled by the National Industrial Conference Board, a private organization. The agreement among the several series is sufficient to indicate that they reflect in a broad way the true trend. The most comprehensive wage data are those derived from the Federal census of manufactures. The average wage for each census year is obtained by dividing the total amount paid as wages in all factories by the

¹ It must not be assumed that the other half of the "value added" by the factories went to capital and management. There are numerous and large items of expense to be deducted from the total before the net value actually created by manufacturing industry is reached (see Chapter X, Section 1).

² Specific wage rates in a number of occupations are shown in Fig. 7. The series of general indexes on which Fig. 11 is based are reproduced year by year in the *Statistical Abstract*, the *Commerce Yearbook*, and the *Survey of Current Business*.

average number of wage-earners of both sexes and of all ages and degrees of skill. The average, of course, may be affected by variations in the proportions of the several classes of workers, but it is perhaps all the more significant on that account.

All these indicators show great advance in money wages and earnings since the beginning of the century, and especially during the period between 1913 and 1919. But what is the real significance of these changes in the light of the "dance of the dollar"? Unfortunately we know all too little about the ups and downs of that agile coin. No doubt the price indexes customarily used to measure cost of living show during most periods the true direction of movement, but they are not sufficiently representative to demonstrate its magnitude accurately. The possible margin of error is by no means small. This is suggested, among other ways, by the fact that the recent revision of the Department of Labor's wholesale-price index changed materially the picture of the advance in wholesale prices during recent years as compared with immediate prewar years. For 1927 the old index had stood 47 per cent higher than in 1913; the revised figure was only 37 per cent higher, a very material difference.

All price indexes are based on samples. The items covered scarcely represent even the major part of the volume of commodities produced and consumed. Naturally only articles of a fairly staple, standardized type are included, since other articles change so much in character that comparable quotations over a series of years are impossible. The commoner foodstuffs and raw materials are ordinarily the backbone of a wholesale-price index; similarly, a retail-price, or cost-of-living, index usually deals only with the simpler articles of consumption. For a country with a relatively low standard of living indexes thus constructed may serve fairly well to reflect the changes in the buying power of money. The bulk of its consumption may consist of the commodities entering the index or of others derived from them by processes so simple that the prices run parallel with those of the constituent materials. The situation, however, is very different in

the United States, with its immense variety of commodities and services and the high degree of elaboration to which materials are in great part subjected.

The most important reason why basic materials and standardized articles cannot, in a country with advanced standards of living, be assumed to represent correctly the price movement of all commodities and services is that a great proportion of the unstandardized goods and services are new things. The price movement of a commodity in the early stages of its introduction is likely to be far different from that of goods which have long been produced in large quantities. Invention and improvements in processes tend to bring down its cost. Even more important, often, the rapid increase in the number of units turned out lessens the cost per unit. An illustration is the fact that, even taking no account of great improvements in detail, the motor car of a given type and make is much cheaper now than fifteen years ago in the face of decidedly higher prices for most of its constituent materials. The great drop in the cost of radio apparatus in the last few years is another. Practically the sole reason for the marked disparity between the old and the revised wholesale-price index of the Department of Labor is the introduction of quotations for a number of more highly elaborated manufactured articles, notably for motor cars. It was not possible to add any large proportion of the endless list of commodities of this type; a more complete representation of them might reduce the index still further as compared with prewar levels.

The important point in connection with the present discussion is that the cost-of-living index customarily used in interpreting money rates of wages and earnings has not been similarly revised. The index is very far from being representative of the actual consumption even of the working classes, to say nothing of reflecting that of the more well-to-do.¹

¹ The Department of Labor, which compiles the index in question, itself fully recognizes and has pointed out this fact. The index put out by the National Industrial Conference Board is virtually the same as that of the Department of Labor in make-up; it is compiled monthly instead of semiannually.

For a majority of American families the prices of motor cars, gasoline, radio sets, and rayon or silk stockings, and the charges of moving-picture theaters are quite as important as the prices of bread or meat or coal or cotton garments. It is probable that a retail-price index truly representative of the consumption of the masses would stand somewhat lower, as compared with the prewar period, than the present index stands. Instead of 170 on the base of 1913 as 100, it might fall as low as 150. As a purely tentative method of arriving more nearly at the recent changes in the cost of living of the working classes, the writer has (see Fig. 11) adjusted the Department of Labor cost-of-living index by making the same percentage of change from year to year as that which appears between the old and the revised index of wholesale prices. It is possible that the figures thus computed still overstate the advance in the cost of living as compared with prewar years, but this must obviously be a matter of opinion. In the diagram the changes in the buying power of wages and earnings in terms of commodities have been calculated both on the basis of the cost-of-living index as published and on the basis of this hypothetical revision.

The general cost-of-living index in any case goes back only to 1913. For earlier years we have only the wholesale-price index (the revision of which, mentioned above, has not been carried back beyond 1913) and the index of the retail prices of food. It is certain that the index of food prices exaggerates materially the advance in the general costs of living between 1900 and the outbreak of the World War. At that time the farmers were coming into their own. The prices of agricultural products, which substantially determine the cost of food, were rising much faster than those of other commodities. Between 1900 and 1913 the wholesale-price index of farm products (not including manufactured food-stuffs) rose by more than 40 per cent, and that of all other reported products (including manufactured foods) by only about 20 per cent. It is virtually certain that the advance in the cost of living was not greater than that shown by the

INDEXES, ON BASE 1914 AS 100

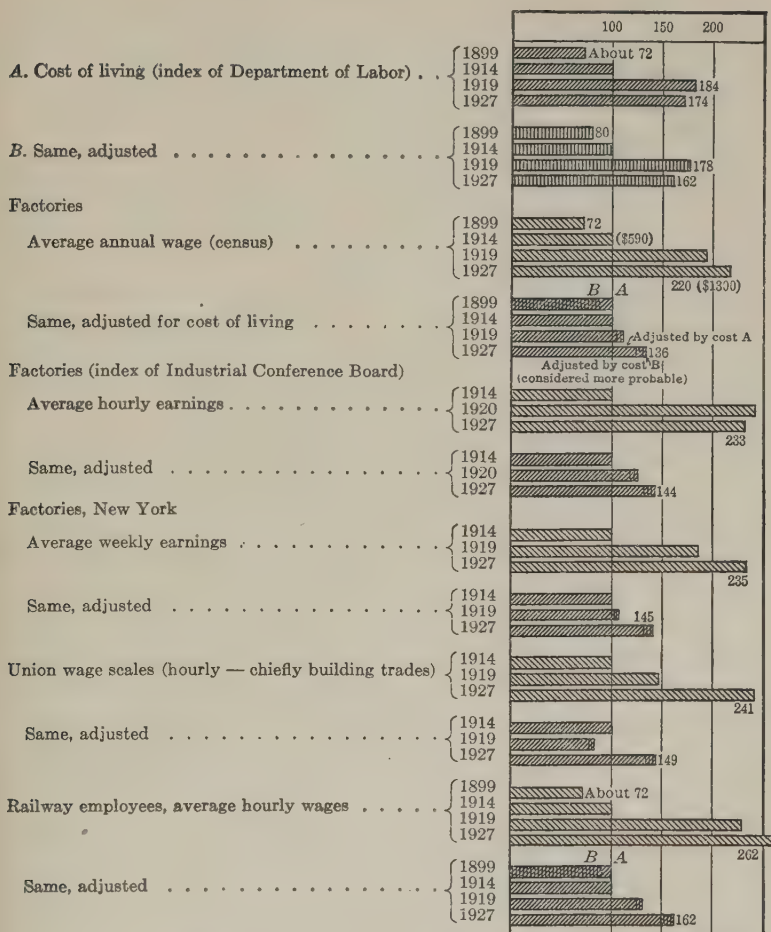


FIG. 11. Diagram showing increase in wages and earnings, 1899-1927

The first group (A) of bars represents the cost-of-living index of the United States Department of Labor with an estimated figure for 1900. The second group (B) represents a tentative revision of the cost-of-living index suggested by the writer; for a discussion of its validity see the text. The remainder of the diagram presents a series of wage or earnings data, with adjustment for changes in the buying power of money according to indexes A and B respectively. In the bars showing this adjustment the full length of those for 1919 and 1927, but the shorter part of those for 1899, represents adjustment according to the B indexes. Union wage scales represent the month of May; for May, 1920, the index was 189

general wholesale-price index, which rose decidedly less than the index of retail prices for food. Indeed, even the wholesale index, based essentially on standardized commodities and giving quite disproportionate weight to farm products, probably overstates the rise in the cost of living during this early period of the century, as it almost certainly does the rise in wholesale prices. In Fig. 11 the adjustment of wages marked "A" has been made for 1899 on the basis of the mean between the index of retail prices for food and that of wholesale prices, and, in the opinion of the writer, cannot possibly represent an unduly low wage figure for that year. The adjustment marked "B" is based on an estimated cost-of-living index for 1899 slightly higher than the wholesale index, and is believed by the writer to be nearer to the truth.

It is regrettable that a discussion of the subject of changes in wages must be so largely negative, pointing out that the statistics do not mean what they seem to say. But the difficulty is inherent. In a country of advanced standards of living the changes in the buying power of money can never be closely computed. Uncritical acceptance of price indexes has led to many false conclusions. Over any long period of time a truer view of the changes in American standards of living is to be gained from other sources — statistics of the production of the goods and services actually used by the masses of the people, and direct observation of the way they live.

The bars in the diagram representing real wages, though taken with much allowance, show clearly that real wages have advanced greatly. Even if an index is used which probably exaggerates the advance in the cost of living, the buying power of wages is much higher at present than at the beginning of the century or at the outbreak of the World War. Adjustment of the price indexes to conform more nearly to what has, according to the preponderance of evidence, actually occurred, indicates still greater rise in the buying power of the worker's labor. The statistics, imperfect as they are, thus confirm what is well known to every competent and fair observer, what the working classes themselves almost univer-

sally recognize, and what their authoritative organizations frankly proclaim. The workingman will seldom admit that he has shared as completely as he ought in the progress of industry, but that he has gained much he will not question.

Although the rapid rise of the prices of food down to the close of the World War helped the farmer, it somewhat held back the economic rise of the city worker. Indeed, a great part of the entire increase in real wages since 1900 came about within a comparatively short period of time just after the close of the war. Never before in American history had such a sudden change in the position of the wage-earner occurred. During the war prices of commodities soared. The high cost of living—"old H. C. L." in current slang—became the topic of every tongue. Wages, as is normal under such conditions, lagged behind prices (perhaps not so much as the price indexes seem to show), but nevertheless they advanced greatly. Not long after the war ended came the inevitable reaction. Business slumped and commodity prices tumbled. The rates of money wages, however, fell little or not at all. During the depression many workers were jobless, but wage scales for the most part were not cut. So, when good times came, real wages—the goods which the wage could buy—were found much higher than ever before in American history. The annual average of money wages in all factories in 1927 was about 11 per cent higher than in 1919, although the official cost-of-living index was about 7 or 8 per cent lower and the decline in the true cost of living probably greater still. Hourly wages on railways rose 14 per cent in the same period. The union-scale index per week, although working hours had been materially lessened, was no less than 28 per cent higher in 1928 than in 1920; wages of building craftsmen, which dominate in this index, have advanced in recent years decidedly more than those of most other classes, but this is partly because their wages had lagged during the war on account of restrictions on private construction.¹

¹ The figure for union wages in 1919, representing the month of May, is scarcely typical of that year as a whole.

6. The farmers of the United States, who in point of numbers rank next after the wage-earners, have improved their position decidedly during the last three decades considered as a whole. Whether they have done so since the war is not so clear, and it is probable that during that time they have not made as great gains as have most other classes of the community. How the increase in their real income compares with that of the wage-earners or of other economic groups, taking the entire period since the beginning of the century, is a matter of controversy and can never be definitely ascertained.

Unlike the wage-earner, who gets his share of any increase in the productivity of industry only indirectly through the employer, the farming class (apart from the approximately one third of its numbers made up of hired workers) gains directly by any addition to the value of its output. Price conditions remaining unchanged, the farmer benefits from every increase in the quantity he produces. We have seen that on the average the farmers are at present producing, in terms of quantity, about 60 per cent more per man than at the beginning of the century. But the relation between the prices of what the farmer sells and the prices of what he buys has been far from constant during the interval. From about 1895 down to the outbreak of the war the farmer got the benefit not only of increasing quantity of output per man but of an advance in the prices of his products decidedly more marked than that in other commodities taken as a group. This was a period of improvement in the economic position of agriculture never before equaled. One of the conspicuous evidences that the increase in farm income was large is afforded by the immense rise in land values. For the United States as a whole the average value of farm land per acre more than doubled between 1900 and 1910, whereas the general wholesale-price index advanced by only one fourth. No doubt the position of the farmer during the middle nineties had been very unsatisfactory, and the increase in his income was partly in the nature of a recovery ;

but it left him better off, as compared with other great classes in the community, than at any previous time.

The war period was wholly abnormal for the agricultural class as well as for other classes in the population, but the farmers apparently found their relative position at least as good when the war closed as before. The quantity of their output per man had risen further, and the prices received for it had advanced by about the same measure as those of the commodities purchased by the rural population.

It is what happened to prices during the immediate postwar period that has made the situation of the farmer a matter of nation-wide discussion and of often bitter controversy, and that has injected it into the arena of politics. Soon after the close of the war the prices of farm products fell enormously, and more than the prices of most other commodities. World demand for farm products is limited and grows little faster than world population. The United States and Canada had greatly increased their farm output to meet war needs. With the resumption of peace Europe rapidly built up its ravished agriculture, and food supplies from the more distant sources that had largely been shut off during the war again flowed to the industrial countries of that continent. The "agricultural surplus" weighed on the prices of crops and animal products throughout the world. During the past seven or eight years prices of farm products have on the whole advanced relatively to other prices, but it is very generally believed that they still bear a relation less favorable to the farmer than for some years preceding the war.

To measure closely the change in prices of what the farmer buys as compared with what he sells is difficult. The obstacles in the way are those already set forth in discussing the significance of general price indexes, whether retail or wholesale. A special index constructed recently by the Department of Agriculture gives the cost of articles purchased by farmers in 1928 as about 56 per cent higher than from 1910 to 1914, compared with an increase of 39 per cent in the prices of farm products on the farm. Even so, in view of the increase

in the quantity of his output, the farmer's income would average considerably larger, in terms of buying power, at the present time than fifteen years ago. The wholesale-price indexes of the Department of Labor distinguish between farm and nonfarm products. The recent revision results in showing, for the last few years, increases over prewar levels of substantially the same percentage for each of the two groups — a relation much more favorable for agricultural commodities than appeared in the index before its revision. Of course, movements of prices of nonagricultural commodities at wholesale in central markets are not necessarily parallel with movements of the farmer's cost of living.

In respect to the price situation as it affects farmers there are material differences between sections of the country and between the several branches of agriculture. There are still greater differences between the individual farmers. Those who have made the most improvement in methods of production are faring much better than the majority.

Quite apart from statistics of farm production and of prices, there are many evidences that the lot of the average farmer is much more satisfactory today than it was at the beginning of the century. The farm families have shared in the consumption of the swiftly growing volume of commodities and services of a semi-luxury character. The great majority of them possess motor cars; the proportion is much larger than among the families of wage-earners, but that fact may be explained by the greater need for these vehicles in the rural community. In many regions practically every farm has its one or more cars. In Iowa, the most typical farming state of the North, there are more than thirty automobiles registered for every hundred persons in the population, the ratio being higher than in any other state except California and Nevada. It is a matter of common observation that many of the cars owned by farmers are not of the cheapest makes. In most parts of the country, too, almost every farm family has its telephone (again a convenience even more needed in the country than in the city). Although by the

nature of things electric light is much less commonly used in rural than in urban communities, large numbers of farms have installed it, and other farm homes without exception now use much more of other forms of artificial light than two or three decades ago. The records of mail-order houses furnish evidence of great increase in the purchase by the farming classes of garments of fine quality and of other advanced commodities that make for high standards of living.

Observation confirms the statistical evidence that farm dwellings have been greatly improved in recent decades. For the country as a whole the average value of buildings, including barns and other structures used for farm operations, rose from \$620 per farm in 1900 to \$1844 in 1925, thus more than trebling; and although this was partly due to higher prices, the true gain was very large. In the West-North Central division, comprising such typical states as Iowa, Kansas, and the Dakotas, the average value of buildings per farm more than quadrupled during this quarter-century.

Finally, the rural population has shared fully with other classes in the benefit of the immense improvement in roads and schools. Good roads mean even more to the farmer and his family than to the city dweller, and the growth in mileage of high-grade roads has been enormous. Not only are rural schools much better in quality than formerly, but the greater prosperity of the farmer enables him to keep his children in school much longer. In Kansas, for example, the average attendance per year of pupils in elementary and secondary schools rose from 85 days in 1900 to 147 days in 1926. In that state, as against an increase of about one fourth in population during these twenty-six years, the number of pupils in high schools multiplied five and one-half times. Greatly increased numbers of young men and women from the farms are likewise getting the advantage of college and university education.

We thus see that the economic progress of the United States during the twentieth century, just as during the nineteenth, has not meant mere enrichment of capitalists and

captains of industry. The standards of living of the masses of the population have taken a long step forward. Grinding poverty has all but disappeared. The masses have attained decent living conditions. Whether their share in the national income has become larger or smaller (a virtually insoluble question), the absolute amount of their income, in terms of goods and services, has risen very materially, probably by from one third to one half in a generation.

SECTION 7. THE POSTWAR UPSWING IN PRODUCTION AND EFFICIENCY

The Marked Shift in Occupations

The few years that have elapsed since the close of the World War have wrought in the United States a transformation of a wholly unprecedented character. Production of commodities has increased rapidly, but at the same time there has been a large shift of workers from the industries which produce commodities to those which render services of various kinds. The great expansion in the use of automobiles has played a major part in the economic changes of this period.

Decade after decade, down to 1920, had witnessed a marked increase in the number of persons engaged in mining, manufactures, and rail transportation. Progress in national efficiency had been reflected by a relative shift from agriculture to these branches. But since 1919 these three branches, as well as agriculture, have lost outright in number of workers in the face of continued growth in the population.¹ Such a phenomenon is virtually without parallel in the modern history of any country. Within the eight years

¹ There are no statistics of workers in the mines, except the coal mines, since 1919. In Fig. 8 it has been assumed that the total is unchanged, but the decided decline in the number of coal-mine workers indicates a probability that the aggregate has fallen somewhat. The data regarding workers in factories are drawn from the biennial census of manufactures; those regarding agricultural workers from the census of agriculture of 1925, supplemented by annual estimates by the Department of Agriculture; and those regarding railway workers from the annual reports of the Interstate Commerce Commission.

from 1919 to 1927 the combined number of persons engaged in the four fields ordinarily considered the very basis of economic life fell by about 8 per cent, or by approximately two millions, notwithstanding that the growth of population had added about five millions to the numbers of working age in the country. Though the decline in the number of workers in factories and on railways is partly due to the fact that the war had abnormally expanded the activity in these fields, this is far from explaining it all.

A movement so extraordinary as this could scarcely fail to cause perplexity and even alarm in the minds of many people. It has seemed to many persons, both in America and abroad, that the "rationalization" of American industry, the increase in efficiency of production, was at the same time filling the streets with unemployed. Such apprehensions are exaggerated. Although there has been some friction in this new movement, its net result has been widespread benefit to the people. The major explanation of the decline in workers in factories is simply that the United States, first among the nations to reach that position, has now become so efficient in the production of goods that it can afford to cut down the number who make them for the sake of increasing the number who render incorporeal services. Another factor is the great increase in the number of young persons devoting their time to education.

Economic progress of the past, in America as elsewhere, has always been accompanied by a shift of workers, relative or absolute, from the production of that which is more essential to existence to the production of that which is less essential, more in the nature of convenience and luxury; therefore it has always involved a decrease in the proportion on the farms, and at times a decrease even in the absolute number. In the United States advance in efficiency has now reached a point where industries farther up in the scale as regards the character of the wants they serve — mining, factory, and railroad industries — can afford to turn over workers to those fields whose product represents still higher standards of living.

There is no such thing as statistics of unemployment in the United States. It is obvious, however, that save for the short-lived depression that followed the immediate postwar boom, the cutting down of the numbers in agriculture, manufactures, and transportation during recent years cannot have resulted in any widespread lack of employment. The best evidence is the fact that the steadily swelling volume of output of commodities has, after all, found a market, and the great bulk of it a market within the country itself. A man out of a job is not a good buyer. Industry during recent years has been highly prosperous; in the great majority of branches its growing output has met good demand. This would have been impossible had some millions of workless men and women been walking the streets.

What, then, has become of these people? The motor car goes a good way toward furnishing an answer. This vehicle has become not only the most conspicuous feature of the landscape, not only the most common topic of conversation, but one of the largest employers of labor and one of the most powerful economic forces of the country. The making of automobiles has grown to be the biggest American manufacturing industry, as judged by value of product; but because of its high efficiency the industry employs only a moderate number of wage-earners (less than half a million), and the decrease in factory workers has occurred in the face of the expansion of this branch of manufacturing. Other occupations connected with motor cars, however, employ far more people than the factories. There are in operation some twenty-five million cars; and their horse power — employed, to be sure, a far smaller proportion of the time than that of most other prime movers — far exceeds that of all other engines, stationary or locomotive, in the country. Transportation of passengers by automobile is several times greater than by railway. The motor truck has done more than to oust the horse-drawn truck: it has created new haulage in large volume.

To distribute, maintain, and operate this vast new transport mechanism calls for a personnel larger than that of the

railways or than that of all the construction trades or than that of all the learned professions. Because of the swiftness with which this new phenomenon has broken into the economic picture, there exists as yet no adequate statistical information regarding its magnitude. Only very rough estimates can be made of the numbers engaged in selling cars, tires, supplies, gasoline and oil, in repair and garage work, in operating taxis, busses, and trucks, and in building roads and streets for the use of motor vehicles. It is entirely possible that the total would reach three million persons. Moreover, the great majority of these have entered this new field within a very few years. The number of automobiles in use has more than trebled since 1919. Service facilities and selling activity, to judge from outward appearance and from limited statistical data, have expanded even more rapidly than the number of motor vehicles. It is very likely that those who have entered occupations connected with automobiles since the close of the war number two millions or more.

Many other occupations have likewise taken up workers let out from agriculture, manufactures, and railroad transportation. Until the next general census (in 1930) only broad impressions and scattered statistics as to what is happening are available. Presumably the number in construction work, the volume of which has more than doubled since 1919, has increased considerably notwithstanding labor-saving devices in this field and a reduction in the time lost through seasonal unemployment. Again, at all times in the past there has been a marked growth in the number engaged in distribution. This movement has probably continued. There have recently grown up thousands of special stores and agencies which distribute new devices for the home or the office or the shop — household electrical apparatus furnishes a notable illustration. Although there has been an advance in the efficiency of distribution, as witnessed by the rapid growth of chain stores, department stores, and mail-order establishments, the customers demand more service than formerly, so that the number of salespeople has probably increased.

In several other fields of service there have been large additions to the numbers employed. The moving-picture theaters, the amusement parks, and other places of entertainment and recreation have expanded greatly. The banking business has grown markedly, as has that of selling insurance, securities, and real estate. The immense volume of motor travel, together with changes in the habits of people, has caused a multiplication of hotels, restaurants, and wayside eating places for the motorists, and the standards of service demanded from such establishments have become more exacting and costly. Apparently, too, the movement into the professions, characteristic of earlier decades, has continued. The increase in the number of teachers in schools and colleges has been very marked.

One distinctly gratifying cause which has contributed to the decline in the number of workers in factories and on farms and railways is the great increase of attendance in educational institutions. Although the proportion of young children in the common schools has not changed materially during the last few years, the number of students in intermediate schools, colleges, and universities has risen at a rate altogether remarkable. In 1920 such students numbered a little over three million; in 1926 (the latest available data) they were more than five million, an addition fully equal to the reduction during these six years in the number of workers in the four great branches of industry for which statistics are here presented. It is probable that by 1929 the total had reached nearly or quite six million. The larger part of this immense growth of attendance in high schools and colleges represents a shift of young persons out of gainful occupations. That it means higher standards of living and promise of still greater efficiency of production in the future is obvious.

It must not be supposed that the dropping of so many workers from the rolls of factories and railways and the movement of so many away from the farms have taken place without hardship. Advance in industrial methods always brings its growing pains, and when the changes are as rapid

as they have been in America during recent years suffering is sure to fall not only upon some wageworkers and farmers but upon some capitalists and business managers as well. In a broad way progress in production cannot at the same time spell retrogression in general well-being. But some must needs be victims of the change. Often those thrown out of a job by a new labor-saving device remain unemployed for some time before they can be absorbed into other lines ; if they are somewhat advanced in age, they may find difficulty in getting placed at all. Still more frequently the displaced worker has to accept lower pay in the new task to which he is unaccustomed. It is no small tribute to the intelligence and fairness of the American workingman that he recognizes the necessity of improvements in machinery and methods and believes that in the broad view the working class gains by them. (For further discussion of this subject see Chapter V, Section 2.)

Although a general reduction in the number of workers in factories is a new phenomenon, the shifts that have taken place throughout past industrial history within the manufacturing branch itself have worked hardships precisely similar to those which have been manifest during recent years. A progressing country always has a certain amount of unemployment, a certain amount of excess productive capacity in the older industries, a certain proportion of firms that are losing money. There is little reason to believe that the proportion of unemployment among wage-earners or the proportion of cases in which shift in jobs has meant lower pay has been greater during the last few years than during other times of prosperity and progress.

*The Increase in Output of Farms, Factories,
Mines, and Railways*

Whatever may be the situation with respect to employment during recent years, it is certain that the decrease in the number of workers in agriculture, mining, manufactures, and rail transportation has gone side by side with a large

increase in the production of those great branches of industry. The American people would not have been willing for the sake of more motor cars or movies or radios, nor even for the sake of more education for their children, to dispense with other commodities and services to which they had been accustomed. Since the war rapid increase in efficiency has enabled the farms, mines, factories, and railways both to supply the people more liberally with their goods and services and to set workers free to take up other tasks.

Fig. 8 (see page 65) summarizes the recent progress of production in the United States. Within an interval of only eight years agriculture, mines, manufactures, and railways together added about 25 per cent to their output of goods and services.¹ The railways, which had been crowded with traffic during the war and the immediate postwar period, have had no occasion to add greatly to the large volume of service then performed, but in the other three branches the gain has been marked. In each of the four great branches of industry a conspicuous advance in efficiency has taken place. Agriculture produced roughly 29 per cent more per person employed in 1927 than eight years before, the mines about 40 per cent more, and the factories approximately 42 per cent more. Progress in the case of the railways is not fully revealed by the statistics of the volume of passenger and freight traffic, for there has been an extraordinary improvement in the quality of service (see Chapter XI, Section 5). The weighted average for the four branches together shows an increase in eight years of fully one third in the quantity of goods and services produced per worker.

The magnitude of this recent gain in the output of industry, especially in the case of the factories, is partly due to the relative inefficiency which prevailed during the war and the immediate postwar period. Output per man in manu-

¹ In the comparison for this postwar period it makes little difference whether the general average percentage of increase in output is based on a weighting according to value of product or according to the number of persons employed. As to the source and basis of these calculations see the footnote on page 64.

facturing industry was actually less in 1919 than before the war. The progress since then represents in some measure the recovery of lost ground. There were even during the war period itself many inventions and improvements in methods and much progress in science. The dislocations caused by war's upsetting hand largely offset the effects of these advances, but with peace they have come to light. Nevertheless a great part of the achievements of American industry in recent years has been the work of these years themselves. The effects of war disorganization had already been outlived before 1923, yet between that year and 1927 the increase in output per worker in the factories was approximately 10 per cent.

The increase in efficiency of industry since the war has carried with it a decided advance in the income of the people. Fig. 10 presents the best available estimates of the national income of the United States during recent years. These show an increase of about 42 per cent in national income between 1919 and 1928, calculated in terms of dollars of uniform buying power. Reduced to a per capita basis the gain was about one fourth. All estimates of income are subject to a considerable margin of error, but not enough to vitiate the conclusions seriously.¹

Other Indicators of Progress since the War

Fig. 12 shows the increase since the close of the war in a number of items of production and other economic indicators. It will be seen that there are only three items listed which have increased less rapidly than the population. Coal production, abnormally stimulated by the war, has declined by reason of the increased use of petroleum and of water power, and of improvements by which more heat and energy are extracted from a given quantity of fuel. Pig-iron pro-

¹ As to the basis of these statistics of income see the note on page 74. The statement in the text above regarding the increase in income disregards the factor of undistributed profits of corporations; if it were added, the rates of increase would be a little greater.

RELATIVE NUMBER FOR 1928, ON BASE 1919 AS 100

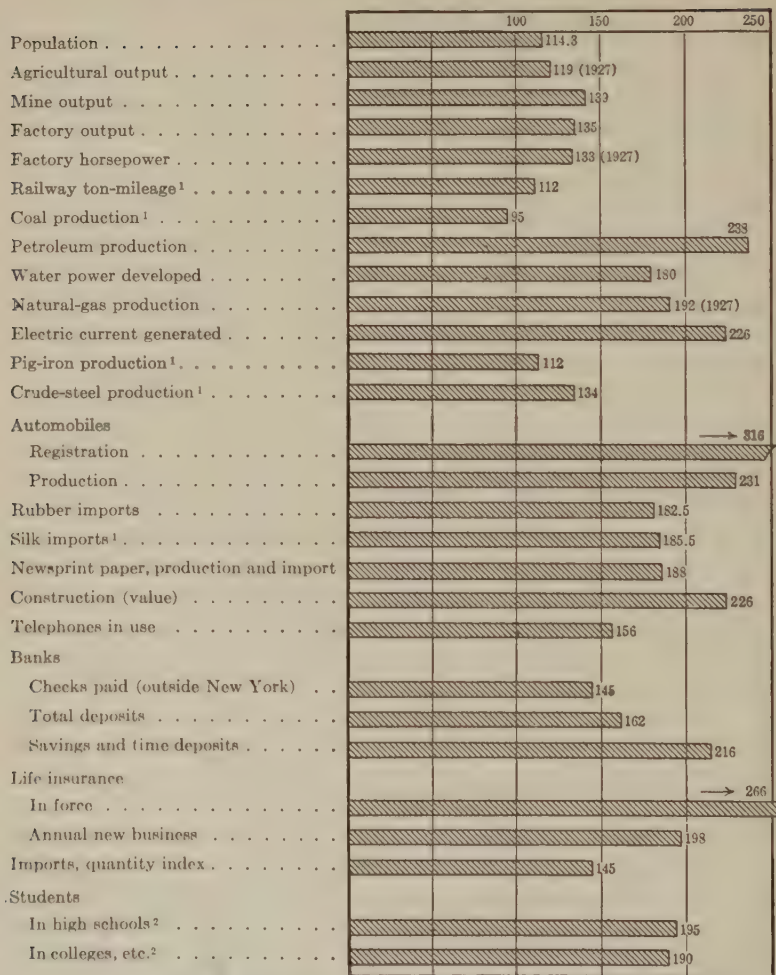


FIG. 12. Diagram showing economic progress since the World War

This diagram represents index, or relative, numbers for 1928 (or 1927) as compared with 1919 taken as 100. The data relating to banking, insurance, and value of construction contracts have not been adjusted for change in the buying power of money, which was considerably greater in 1928 than in 1919; therefore they understate the effective increases

¹ Based on average of 1919 and 1920 as 100, 1919 being abnormal.

² Comparison of 1920 and estimated figures for 1928.

duction has ceased to be a significant indicator because of the constantly increasing quantities of steel produced by remelting old material; steel production itself increased by 30 per cent between the close of the war and the year 1928. Railway traffic was exceptionally great under war conditions, and its growth has been checked in some measure by the development of motor transportation and by that of coastwise transportation and intercoastal movement through the Panama Canal. Most of the other indicators listed show for this short period of eight or nine years increases ranging from 40 per cent to more than 100 per cent. The most marked gains have been in items which represent high standards of living. Thus, we have exceptional increases in the production of automobiles, of petroleum and rubber goods (which go along with automobiles), of electric current, of silk goods, and of printed matter. The large gain in imports points to growing ability to command foreign luxuries and semi-luxuries. The great expansion of life insurance and of attendance of students in high schools and colleges points to the ability of an ever increasing proportion of the population to afford protection for their families and good education for their children.

Taking it all together, the numerous indicators of economic conditions combine to show an expansion since the close of the war scarcely equaled in any previous period of American history. This expansion is the more significant because it represents advance not from a lowly beginning, but from an economic stage already high in comparison with other countries or with earlier decades.

SECTION 8. FACTORS IN AMERICAN PROGRESS AND PROSPERITY: A SUMMARY

The great national income of the United States, the high standards of living of the masses of the people, and the rapid and continued advance of income and of standards of living are not accidental phenomena: they are the result of very

positive causes. The more basic of these causes are neither numerous nor difficult to discover. There are, however, many secondary links in the chain of causation. The fundamental forces flow through numerous and intricate channels.

These factors in American prosperity and progress are more fully set forth in the next three chapters. It will be advantageous here to summarize them briefly and to call attention especially to the interrelations — the reciprocal influences — among them.

The most basic of the causes that have made American economic life what it is are the following :

1. The character of the American people itself.
2. The character of the country.
 - a.* Its great area.
 - b.* Its geographical isolation.
 - c.* Its rich and varied resources.
 - d.* Its consequent large measure of self-sufficiency.
3. The freedom from overcrowding — the abundance of land and other resources in proportion to the number of inhabitants.

The American population consists chiefly of the white race — that race which throughout almost every period of history has been the leader in economic efficiency and economic progress. Most of the early settlers, a very large proportion of the present total population, and a dominant proportion of those in the more responsible economic positions came, or are descended from those who came, from the most prosperous and progressive countries of Europe. The immigrants from these countries brought not only good blood but rich accumulated experience. The conditions of pioneer life tended to build forceful men. Even down to the present time the opportunities afforded by the new continent have been a powerful stimulus to the imagination. Everything has conspired to engender ambition, self-reliance, industry, respect for work, and freedom from caste.

The immense size of the country is a major explanation of the variety of its resources. Mere size tends to security.

It renders invasion difficult ; it makes possible a large population, which in turn adds to national security ; and a large population affords a big market, thus tending to cheapen costs of production. The geographical isolation of the United States, separated by wide oceans from the other populous countries, also helps to assure its peace.

The United States has immense riches of land and climate, of forest, stream, and mine. Its resources are not richer in proportion to its area than those of some smaller countries, but even in this respect it compares more than favorably with most other lands. These resources, moreover, are highly varied. They afford a basis for the production of most of the important commodities required by an advanced standard of living. For this reason American industry is exceptionally self-sufficing, a fact which tends to reduce costs and which is of major importance in promoting national security.

Finally, and of altogether first-rate significance, America's resources have never been taxed by overpopulation. It is far more thinly peopled than most countries with anything like comparable resources. This circumstance is particularly important as regards agricultural land. Inasmuch as land is abundant a relatively small proportion of the population can feed the whole, leaving the others free to produce more elaborated goods and more advanced services.

It is the coexistence of these basic factors in America which makes them count so heavily in national upbuilding. An efficient people in a poor or overcrowded land or an inefficient people in a rich and thinly settled land will alike fail to attain high prosperity.

Among the many secondary factors in the well-being and progress of the United States, perhaps the following stand out most conspicuously :

The high standards and wide spread of education and of scientific research.

The position and attitude of the wage-earners: their high wages, their relative contentment, and their favorable disposition toward methods that make for large production.

The large use of machinery and other forms of capital.

The large use of mechanical power, and especially of power applied through the intermediary of the electric current.

The big scale on which most business operations are conducted.

The mass production of standardized articles.

The systematization of business: the scientific study of methods, the careful calculation of costs, the organized conduct of research, the coöperation among business men to common ends.

The freedom of individual initiative, combined with a disposition of individuals to work together in great, but usually privately owned, enterprises.

The manner in which these various secondary factors depend upon the more basic causes is obvious. The conditions, attitudes, and practices mentioned contribute to the wealth of the country, but they are at the same time a result of its wealth. It would scarcely be possible, for example, to maintain either high standards of education or high wages without having capable people and rich resources. Still less could large stores of capital be built up. Large-scale business and mass production can reach high development only where there is a wide market, and a wide market demands both a big area and a population of high buying power. It is evident, too, that close interrelations exist among these various secondary factors themselves. For example, standards of education are tied up with all the others. Again, large use of capital is essential to large-scale operation, to mass production, and to the most systematic conduct of business.

A new word has recently come into the vocabulary of economists and of business men in both Europe and America, and into all the principal languages. This is "rationalization" (*Rationalisierung* in German, the language in which the expression was perhaps first introduced). What industry needs, it is widely proclaimed, is to be made rational, to be run according to reason. The word connotes somewhat different things to different minds, but in a broad way it covers precisely those methods and attitudes which have been listed above as contributing to the prosperity and progress

of American business. Indeed, many Europeans of late have come to view the industry of the United States as a model to be copied as closely as possible. No doubt they often hold exaggerated ideas of what has been attained in America. Its industries are as yet far from being perfectly rationalized. No doubt, too, some practices which succeed well in the United States are not applicable to conditions in Europe. At best Europe lacks in a measure those basic natural advantages which America possesses and which make it easier to rationalize industry. It is none the less true that rationalization of production and trade can accomplish much on both sides of the Atlantic, and of the Pacific as well. The world over, the possibilities of economic progress under wise policies today appear much more promising than they appeared even a quarter of a century ago.

CHAPTER III

PRIMARY FACTORS IN AMERICAN PROGRESS: THE POPULATION

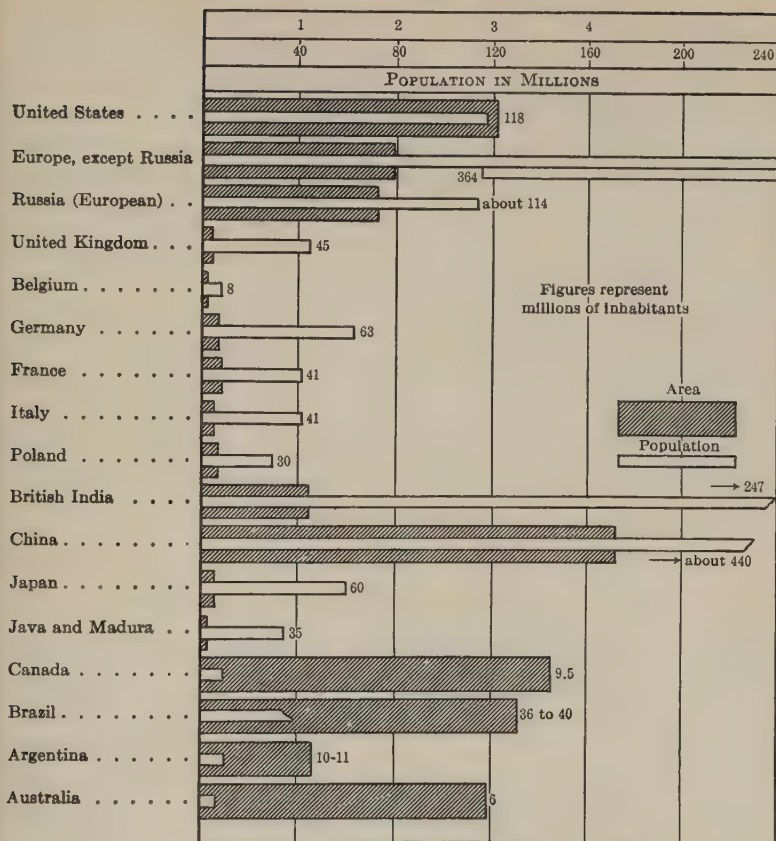
SECTION 1. NUMBER OF INHABITANTS AND DENSITY OF POPULATION

The population of any country is the dominant factor in its economic life. It is both the end for which wealth is produced and the chief agency in producing it. The character of the people will naturally have a great deal to do with the efficiency of industry, and the relation between the number of inhabitants of a country and its size and the volume of its natural resources is of great importance in determining well-being.

Area

The sheer bigness of the United States is one of the most significant aspects of its position in the world. In proportion to their area several other nations have richer resources at least as regards agricultural land; in the aggregate, however, the United States stands almost if not quite the leader among the countries in the volume of nature's gifts within its borders. Russia and China are the only possible rivals. Bigness is of special significance with respect to agriculture, the most basic of industries. Factories, railroads, stores, and offices require a little land on which to rest; vast mineral resources may lie beneath a small area; but, by the nature of things, the raising of crops and live stock demands broad acres. A large country, unless climate and soil are below par, has from the start an advantage in these fundamentals.

A. AREA, IN MILLIONS OF SQUARE MILES



B. DENSITY OF POPULATION: NUMBER PER SQUARE MILE

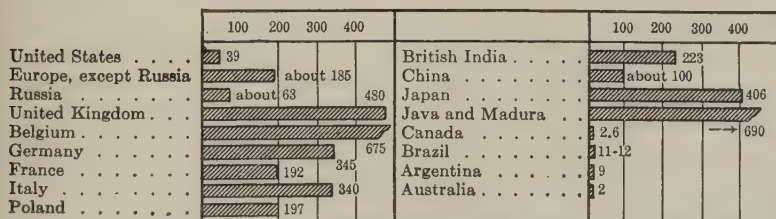


FIG. 13. Diagram showing area and population of typical countries

Data relate in most cases to 1926 or 1927. Note that four of the bars do not show the full figures

The United States has not far from three million square miles of territory — a little more if bodies of water are reckoned in, a little less without them. This total, which does not cover Alaska or insular possessions, is equal to five sixths of the area of all Europe. It is half again as large as all the twenty-five European countries, outside of Russia, put together. Texas is bigger than France; California is nearly equal to Germany. There are eight states each of which outranks the United Kingdom in area. Only five other countries are comparable in size with the United States. Russia, China, Canada, and Brazil are larger, and Australia has the same area. All five of these, however, suffer from handicaps of soil and climate much graver than confront the United States. Even enormous Russia, with more than eight million square miles, perhaps scarcely surpasses it in agricultural and mineral resources.

Number of Inhabitants

Although the United States is less densely peopled than most other leading nations, it has an aggregate (1929 estimate) of more than 121,000,000 inhabitants. It ranks fourth among the countries in numbers. Russia has a little greater population; China and India, a far greater. The United States has 90 per cent more people than Germany, the most populous of European states apart from Russia. It has between two and three times as many as the United Kingdom or France or Italy.

The mere magnitude of the American population contributes greatly to its well-being. Aggregate economic strength represents the average capacity of the individual multiplied by the number of individuals. Up to the point at which pressure of population on resources cuts down per capita production, numbers make directly for economic and political power. This in turn reacts to promote per capita efficiency. It favors national security and it lessens the necessity for large employment of the time of men in military training

and for large outlay of money for national defense. The people are left more freedom for the pursuits of peace and for the production of wealth.

Besides this, a big population means a big market. Many kinds of goods can be produced far more cheaply in large than in small quantities. This is particularly true of the more elaborate manufactured articles: machines, automobiles, electrical instruments, and the like. In America mass production is made possible in unique measure by the immensity of the home market. It should not be forgotten, however, that this advantage of large population tends to disappear if the people are poor. It is precisely in articles which only a people of high buying power can afford in large numbers that mass production offers the greatest savings; the bare necessities can for the most part be produced almost as cheaply on a small scale.

Density of Population

In the United States population balances well with area. The well-being of any country is much affected by the degree of density with which it is peopled. Undue sparseness is not favorable to efficient use of resources; overcrowding is disastrous: it means simply that the individual has to put up with meager aid from the powers of nature, especially with respect to agriculture. A middle position as to density of population makes for prosperity.

The number of inhabitants per square mile, taken by itself, offers a very inadequate measure of the relation between the volume of natural resources and the number of inhabitants. A square mile of desert means little in supporting life. America's land, however, considered as a whole, stands above the world average in quality. In this respect the United States probably ranks below Europe taken as an entirety, but above any other continent. Approximately half the United States is capable of at least fair agricultural production, and at least a third is of excellent soil and

climate. No country has richer mineral deposits; few, if any, have better forests. In respect to agricultural resources a number of nations are more richly endowed in proportion to their size than the United States; but American lands, the good with the bad, can match against those of at least three out of four of the countries of the world. Consequently comparison of the density of population per square mile with that of other parts of the world is not lacking in economic significance.

The United States is much more thinly peopled than most of the states of Europe and of eastern and southern Asia. Its inhabitants number on the average forty per square mile. Despite the comparative emptiness of great areas in the north of Europe, that continent has about one hundred and thirty per square mile; leaving out Russia, about one hundred and eighty-five. For fairer comparison with this latter figure the sparsely settled Rocky Mountain division should be dropped out of the reckoning; the remainder of the United States has about fifty-five people per square mile. Even the section east of the Mississippi has less than half as dense a population as Europe with Russia left out.

Overcrowding spells poverty most of all to those countries which are primarily dependent on their own domestic food supplies, not being sufficiently advanced industrially to pay for imports of food with manufactured goods. India, China, and Russia are striking examples. Soil and climate are more favorable to agriculture in British India than in the United States, but the difference is not very great. India has a population nearly six times as dense as the United States — five times as dense as Iowa, a state richer (in proportion to area) in agricultural resources than India. The fertile regions of China (not the whole, which includes a great deal of desert and mountainous land) are even more packed with people than India. Americans often think even of European Russia as comparatively empty: but it has more than sixty inhabitants per square mile, and its more fertile sections have from one hundred to two hundred.

Several European nations have a more highly developed factory industry than the countries just mentioned, but are at the same time approximately self-sufficient in food supplies. The most typical are France, Poland, and Italy. The last-named country, classic example of pressure of population on resources, is eight times as densely peopled as the United States. France and Poland have between four and five times as many per square mile. Even as compared with such a highly industrialized section as the East North Central division (Ohio, Indiana, Illinois, Michigan, and Wisconsin), these two countries are over twice as thickly inhabited. Japan, the Italy of the Asiatic continent, is making marked strides in industry, but is still forced to rely substantially upon its own soil to feed its teeming millions. Japan numbers four hundred inhabitants per square mile, ten times as many as the United States and not far from twice as many as the state of New York with its world metropolis.

The most densely populated countries of Europe are those which have frankly given up the effort to feed their population from domestic sources. Belgium, the Netherlands, the United Kingdom, and Germany, named in the order of density of population, live primarily by manufactures and commerce. They have from eight to sixteen times as many people in proportion to their size as the United States and from two to three times as many as the Middle Atlantic states. If America were as crowded as this group of western European nations taken together, it would have far more than a billion inhabitants. Well might its people then be cudgeling their brains to find food, clothing, and employment.

In Chapter IV we shall recur further to the economic significance of excessive density of population in connection with the discussion of agricultural resources.

Among important countries quite at the other end of the scale are Brazil, Argentina, Canada, Australia, and Asiatic Russia. These, ranking in density in the order named, have from about one fourth as many people per square mile as the United States to less than one twenty-fifth as many.

The thinness of their population is partly due to the newness of settlement, but even more to deficiencies of soil and climate. They are not likely within any measurable future time to reach even the present density of the American population.

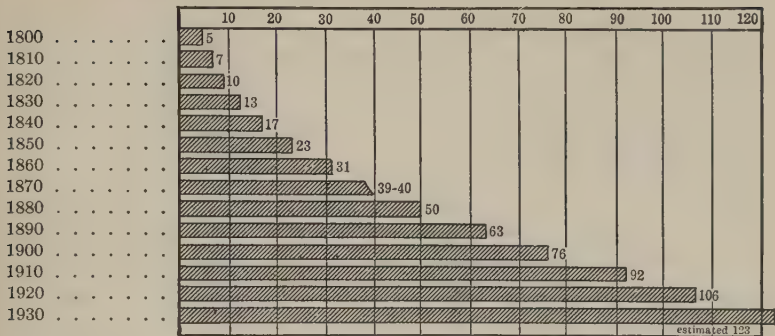
SECTION 2. GROWTH OF POPULATION

What are the prospects as to the future population of the United States? The question is of major importance in its bearing on the well-being of the coming generations. Increase in numbers within limits is an economic advantage. In a new country it may add to the per capita production of wealth. Gain in numbers too may strengthen a nation in its political position in the world and make it better able to resist possible attack. On the other hand, the point may easily be reached — it has been reached in the case of many countries — where rapid growth is a harm and not a benefit. Growth ought never to outstrip the discovery of new resources and the development of more efficient means of utilizing them; preferably it should lag behind such progress. The prospects for America may be judged both by comparison of its growth in population with that of other countries and by comparison of the rate at different periods of its own history.

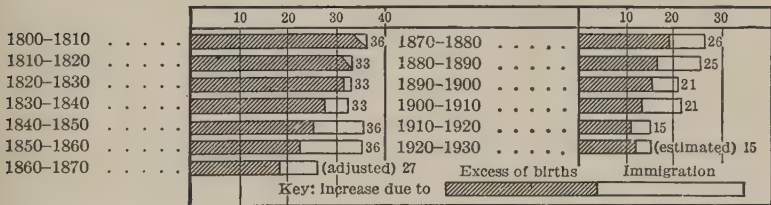
The Past Rate of Growth

Up to the outbreak of the World War the population of the United States grew rapidly. The war almost put a stop to immigration, and subsequent legislation has prevented it from regaining anything like its former volume. The rate of increase of population has consequently fallen off. It remains higher than in most other countries, as might be expected from the fact that America is still much more thinly settled and has more undeveloped resources than most other lands. Needless to say, the war checked increase in Europe. In some of the countries there the number of

A. POPULATION OF CONTINENTAL UNITED STATES, IN MILLIONS



B. DECADE RATES OF INCREASE IN POPULATION, IN PERCENTAGES



C. COMPARATIVE INDEXES OF POPULATION INCREASE TO 1910

1860 (OR 1870) TAKEN AS 100

1900 TAKEN AS 100

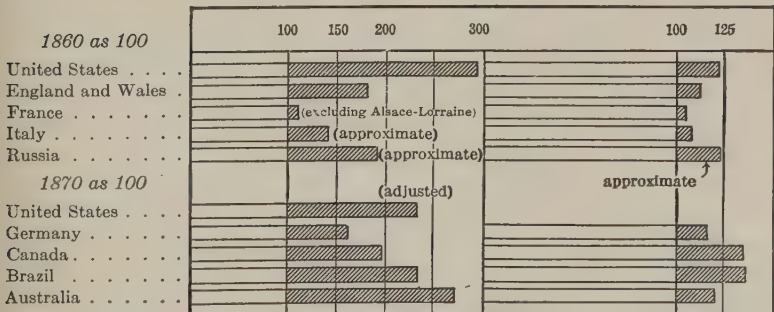


FIG. 14. Diagram showing comparative growth of population in leading countries

Section A shows the population at each census; section B, the percentage of increase during each decade, distinguishing the part due to excess of births over deaths and that due to immigration; the estimates are those of E. B. Reuter. Section C compares the growth of the United States with that of other countries

inhabitants is scarcely greater than before that catastrophe. It is by no means certain that such countries as England, Germany, Italy, and Russia will ever fully resume their prewar pace in population. For this reason prewar comparisons between Europe and America are hardly trustworthy indicators of future tendencies.

The increase in the numbers of the American people has been but a part of the general expansion of the white race. From their former confines in Europe and the adjacent Mediterranean region the whites have poured forth into the empty spaces all over the world. Yellow, black, and brown men number not more than twice as many today as they did two centuries ago; white men number roughly five times as many. The population of Europe itself has more than trebled since 1750. Meantime that continent has sent across the seas tens of millions of its sons and daughters, and they in their new homes have multiplied still faster. It is estimated that outside of Europe there are now living not far from one hundred and fifty million people of European birth or ancestry. The expansion of population in Europe itself during the last two centuries was made possible chiefly by better use of long-known natural resources, by advancement in methods of production. In the United States and other newly settled countries this factor, although even more potent than in Europe, has been immensely supplemented by calling into man's service vast untouched resources of land, forest, and mine.

In the half-century from 1860 to 1910 the population of the United States nearly trebled, rising from 31,000,000 to 92,000,000. Europe, taken as a whole, gained about 60 per cent during this period. Her fastest-growing country was Russia, which, including Asiatic territory, approximately doubled in population during these fifty years. Next in rate of increase were Germany and Great Britain (not including Ireland), both of which added about three fourths to their numbers. Italy had grown about 40 per cent in population. France, as is well known, had increased but

little. For many years preceding the World War, however, the disparity between Europe and the United States in rate of growth in population had been narrowing. The pace was gradually slackening in this country. Thus it came about that in the first decade of the twentieth century Russia (according to rather rough estimates) rivaled the United States in the increase of numbers, despite enormous immigration to this country and considerable emigration from Russia. The rate of increase of the United States during the war decade (15 per cent), which probably will be no more than equaled during the decade in which we are now living, was only a trifle faster than that shown by Germany between 1900 and 1910.

It is also interesting to compare the growth of population in the United States with that in newly settled countries. Argentina, Australia, and Brazil have somewhat outpaced the United States in recent decades, but not greatly, and they are still far below in actual number of inhabitants. Canada, for all its comparative emptiness, grew less rapidly than the United States from 1850 to 1900, but since then it has grown considerably faster.

Among most of the old and densely peopled countries outside of Europe, increase in population is slow, as might be expected. Of these, only Japan and the Netherland East Indies appear to have added very greatly to their numbers during the past half-century. Japan, emulating Western countries in the development of manufactures and foreign trade, increased its already very dense population by 50 per cent between 1888 and 1925. The United States gained about 90 per cent during this same period.

Immigration and Natural Increase

Immigration has been a great factor in the growth of the American population, and changes in its rate of growth have been much affected by variations in the amount of immigration. Between 1830 and 1925 the enormous number of

51,000,000 immigrants landed upon American shores. Many of these went back to their old homes, but the net excess of arrivals over departures was at least 35,000,000 and perhaps 40,000,000. Moreover, the immigrant families are of greater fecundity than the older stock, and their liberal contribution of births has swelled population.

Calculations of the contribution of immigration to the American population are necessarily in one sense inconclusive; one must beg the question whether the natural growth would have been different had there been no influx from abroad. Some contend that the native stock has restricted its birth rate precisely by reason of the tide of foreigners; that parents have hesitated to bring into the world children whose standard of living might be forced down by the competition of those accustomed to a lower wage. It is doubtful, however, whether such a sentiment has played a very important part. In spite of its rapid multiplication of numbers the new continent has continued to offer rich opportunities. The fear of pressure of population on resources and of a decline in standards of living has found little lodgment in the public consciousness. The marked falling-off in the birth rate has probably been due chiefly to causes other than the inflow from foreign shores.

Fig. 14 shows the actual growth in population from decade to decade, with the best available estimate of the share in that growth from natural increase and from immigration respectively.¹ In the several decades since 1840 immigration is credited with from one sixth to one third of the total gain in numbers, the proportion varying materially with the waves of migration. The most striking fact is the almost unbroken decline in the rate of natural increase. Although from 1800 to 1860 the expansion of the total population was remarkably steady (in the neighborhood of one third every ten years), this uniformity masked the steady fall in natural increase, which was offset by rising immigration. The next

¹ Estimates of E. B. Reuter, in "Population Problems in the United States and Canada" (1926), p. 23.

three decades mark a second period in the rate of growth, about one fourth being added to the population during each ten-year period. The Civil War checked both natural increase and immigration. The decade from 1870 to 1880 was the only one in American history to show more rapid natural growth (by a small margin) than the preceding decade. From 1880 to 1890 only an extraordinary volume of immigration made possible a continuance of the previous pace in aggregate increase.

From 1890 to 1900 the increase fell off rather sharply to barely one fifth. The depression during this decade worked to lessen immigration decidedly. The growth during the next decade was a trifle greater, but this was only because of the unprecedented flood of arrivals from foreign lands. Nearly 9,000,000 poured in between 1900 and 1910, and the excess over departures of aliens was at least 6,000,000. The abnormal check to immigration resulting from the World War and the subsequent restrictive legislation have brought about a fourth period in the rate of increase; it is now between one seventh and one sixth per decade.

Birth and Death Rates

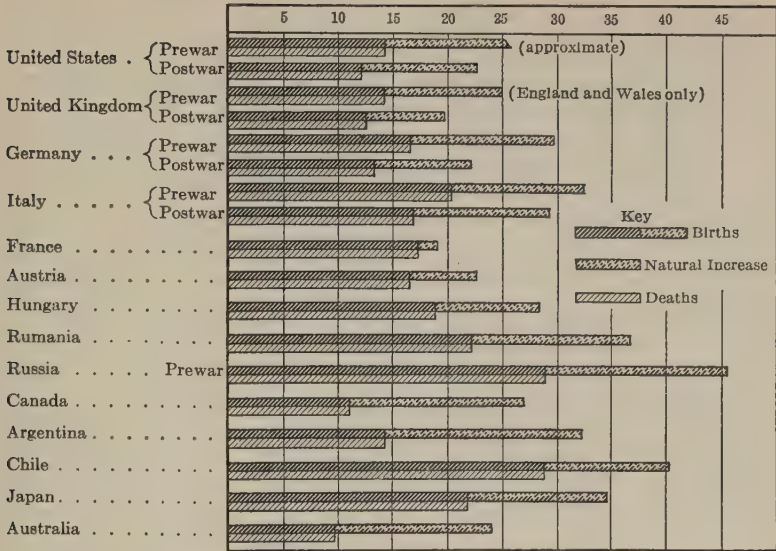
The difference between the birth rate and the death rate measures the natural increase in number of inhabitants; but the social and economic significance of natural increase depends in no small degree on the absolute level of these two rates. France has a relatively low death rate, but also a birth rate so low that the population is stationary. China has very high rates both of natality and mortality, and the two are approximately equal. In Russia the relative number of deaths is likewise heavy, but the birth rate is normally so extraordinary that the population gains rapidly. In the United States appears the much more healthy phenomenon of a low death rate with enough more births than deaths to yield a steady but not extremely rapid increment to the population. The contrast between America and

Russia is startling. Each year (prewar data) Russia witnesses about forty-five births per thousand of the total population; in the United States there are barely half as many (postwar data). But the death rate in the great Slavic empire is more than double the American rate — about twenty-nine per thousand against thirteen. The natural increase of numbers in Russia is thus the greater. The method of attaining that increase, however, entails a heavy burden on the Russian people. The death of a human being before he has contributed long years to the world's work means economic waste, to say nothing of sorrow and suffering. The infant death rate in Russia is appalling.

Both birth and death rates are much affected by the make-up of the population as regards sex and age. Whether or not one takes these factors into consideration the United States occupies a very favorable position among nations. Fig. 15 presents comparisons unadjusted for sex and age, since for some of the countries adjusted rates are not available. In the United Kingdom, Germany, and Italy rates of births and deaths were both decidedly higher before the war than during recent years. The reduction in deaths has been largely the result of the declining birth rate, since mortality among infants is normally high. For some of the countries shown there has been no such marked change, and for Austria and Hungary prewar figures would not be comparable with current data because of change in boundaries. It will be seen that the death rate is somewhat lower in the United States than in northwestern Europe and that the birth rate is higher. Both death and birth rates are lower, in some cases far lower, than in most of the other countries listed. The fact that the American death rate is higher than in Canada and Australia is due to the relatively heavy mortality among Negroes in the United States, to the greater proportion of immigrants from countries with a low standard of living, and to the greater proportion of urban population.

Through some strange defect in American notions of the relative importance of things the system of registering births

A. BIRTH AND DEATH RATES PER 1000 INHABITANTS



B. AGE DISTRIBUTION OF THE POPULATION ABOUT 1910, IN PERCENTAGES

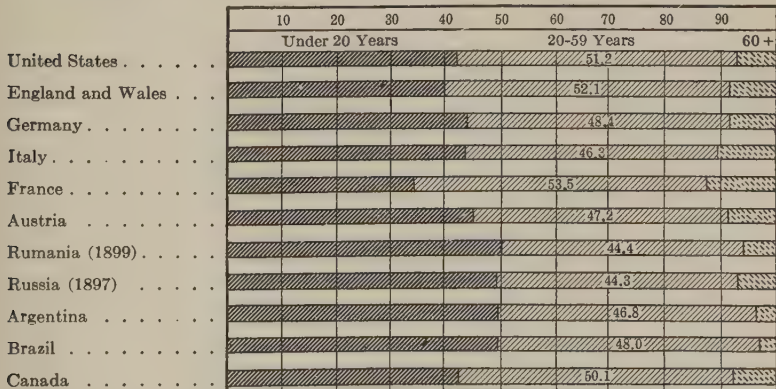


FIG. 15. Diagram showing birth and death rates and distribution by ages

Section A shows the average annual number of births and of deaths per 1000 of the population, the difference between the two bars representing the natural rate of increase apart from the effect of immigration or emigration. The figures are, in most cases, averages for the five years 1921-1925; the prewar data relate chiefly to the period 1908-1913. Section B shows the proportion of the total population falling in each of three great age groups. Prewar figures are used because the war disturbed the normal distribution in a number of countries

and deaths was until recently very little developed. Several states still lack these records, vital in a double sense ; therefore it is impossible to trace closely the manner in which the earlier growth of population was affected by changes in natality and in mortality. There can be little doubt, however, that both the birth rate and the death rate have fallen fairly steadily for many decades. The same is known to have been the case in all the more advanced European countries. In the comparatively few states which then registered deaths, the number recorded in 1880 was equal to nearly twenty per thousand inhabitants. In those states which had registration at the beginning of this century the average annual rate from 1901 to 1905 was a little less than sixteen. In the last few years it has averaged about twelve. Until very recently birth statistics were not available for any considerable part of the country. It is evident, however, from the decline in the pace of natural increase that the birth rate must have fallen still faster than the death rate.

The marked decline in the death rate in America reflects advance in medicine and hygiene. It likewise reflects improved economic conditions : better housing, clothing, and food, and larger means to pay for proper care of mothers and children, the sick, and the aged. Conversely, the cutting down of the number of deaths has itself served to raise the economic status of the people ; it is one of the many ways in which waste is being eliminated.

Future Growth in Population

The decline in the rate of natural increase of population in America is by no means regrettable. An indefinite prolongation of rapid growth would threaten ultimately to put severe pressure on natural resources, particularly on the agricultural land. A rate of increase of over 20 per cent per decade, such as prevailed between 1890 and 1910, would (compounded) have meant more than 190,000,000 people in the country by 1950 and more than 330,000,000 by 1980 —

less than two generations from the present day. Fears are sometimes expressed that something like this will actually happen: that before long the United States will be as densely peopled as Europe, and that its standards of living will inevitably be lowered.

There is little likelihood, however, that population will maintain anything approaching such a rate of expansion. Present restrictions mean that immigration will swell America's numbers far less than before the war. The number permitted to come in from European countries is limited to about 150,000 annually, and on account of reëmigration the net addition is much less. Immigration to the United States from other parts of the American continent, which is not restricted at present, is necessarily of moderate volume. During the five years (1909-1914) preceding the World War the annual number of incomers averaged more than 1,000,000, and the excess over departures was nearly 750,000. On the other hand only about 317,000 immigrants were admitted annually from 1926 to 1928, and the net yearly addition to the population from this source averaged only 241,000.¹

It is not likely that the American people will ever again let down the bars thus set up. They are not eager to have population grow rapidly. The restriction policy may not fairly be construed as selfish. It is not in the interest of the other peoples of the world, any more than of Americans, that the United States should become overcrowded. They would lose, not gain, should this country cease to go forward in economic efficiency and political and social well-being.

There are indications that, since the close of the war, perhaps as a result of the advance in general well-being, the birth rate and the natural growth in numbers, by exception to previous trends, are about holding their own. Nevertheless it is probable that the long-time tendency toward an ever-slowing rate of natural increase will later reappear. Among a population so advanced in intelligence as that of America

¹ For further data as to immigration restrictions see Section 3 of this chapter.

increase in numbers is neither uncontrollable nor actually uncontrolled. People accustomed to a high standard of living resist the lowering of it. They know that unduly large families mean less income per member. They take thought before bringing children into the world. Just as low standards of living among any people often lead to an excessive birth rate and thus perpetuate themselves in a vicious circle, so high standards tend to a beneficent circle. Both have a powerful inertia. The American people are scarcely likely to wait till the grip of actual poverty from overcrowding directly swells the death rate and checks the expansion of population; rather will they put on the brakes the moment any tendency toward lower standards of living begins to manifest itself, perhaps even the moment there is any slowing of the rate of advance in such standards.

SECTION 3. COMPOSITION OF THE POPULATION

Sex and Age

The productive capacity of a people is affected by its sex and age composition. A nation with a large proportion of males in the more active age periods — say from twenty to fifty or sixty years — tends to produce more than a nation with a high proportion of women, children, and old persons. Sex and age distribution are both much influenced by migration. Adult men, especially in the earlier years of maturity, generally predominate among those who leave their native country for a new home. The age distribution is further affected by birth and death rates. Where health conditions are favorable and both birth and death rates low, the proportion of adults is large.

The United States is a country of both large immigrant population and favorable natality and mortality ratios; consequently it has a larger proportion of males in the prime of life than most nations. In the leading states of Europe, with the exception of Ireland, prewar statistics showed from 103 to 110 females to each 100 males. As a result of war's

decimation the proportion of males is now still lower. In striking contrast the United States (1920) has only 96 females per 100 males. The proportion in Brazil is about the same; in Argentina and Canada males outnumber the other sex even more heavily. So far as men can be deemed to contribute more than women to the national output of goods and services, the newer countries have an economic advantage over the older.

Again, in the United States persons between the ages of twenty and fifty-nine years, inclusive (for convenience these may be styled as in the prime of life), make up a little more than half the entire number of inhabitants — 51.2 per cent in 1910 and 51.8 per cent in 1920 (see Fig. 15, *B*). The proportion does not differ very much from that prevailing in the more advanced and prosperous nations of Europe, such as Germany and England, before the war disturbed the normal balance. In France, to be sure, as the result of a very low birth rate, the proportion of young persons was exceptionally small, and those in the prime of life were an appreciably larger proportion than in the United States. Quite different, however, was the situation in the southern and eastern countries of Europe. Partly because of the heavy outflow of migrants and partly because of the high birth and death rates, these countries had decidedly fewer in the prime of life. Thus in Italy 46.3 per cent of the population in 1910 was between the ages of twenty and fifty-nine; in Russia, only 44.3 per cent. The productive elements in such countries have a heavy burden in supporting the unproductive. Their unfavorable age distribution is both result and cause of poverty.

In Canada and Australia the age distribution is approximately the same as in the United States, and for similar reasons. Argentina and Brazil, despite heavy immigration, have a decidedly lower proportion of persons in the age groups of greatest productivity; the proportion is held down by the high birth rate and by the somewhat lower standards of living and of public health.

Races and Peoples in the American Population

America is dubbed "the melting pot of the world." The phrase, however, has various meanings in the minds of people who use it. Some conceive of the American population as wholly lacking in racial unity — as a vast assembly of diverse and unamalgamated races and peoples; others think of it as mongrel in blood, devoid of the clean-cut marks of a purer stock; to still others the melting pot connotes a fusion of elements into a new and better alloy.

It is necessary to bear in mind that whereas some racial stocks differ but little from some others, there are, on the other hand, stocks widely apart in their physical and mental characteristics. Many gradations exist, but it is possible to distinguish between the great races of mankind, few in number, on the one hand, and mere branches and strains of these races on the other. It is unscientific as well as ungracious to think of the differences between peoples, whether these differences be wide or otherwise, as necessarily connoting inherent superiority or inferiority. No ethnological yardstick for measuring physical, mental, or moral worth is universally accepted; by the nature of things none can be.

Experience the world over seems to show that it is undesirable for two or more widely divergent races either to mix or to live in large numbers in the same country without mixing. If they live side by side without amalgamation of blood, there is sure to be friction; one race usually gets the upper hand economically if not politically. If they intermarry, the mixed stock is looked at askance by the pure stock; too often it loses the good characteristics of its constituent elements and retains the bad. The situation as regards groups of people which differ relatively little from one another may prove far simpler. The mixture of their blood may result in no deterioration, may possibly even produce a stronger and better stock. Whether when they are brought together in the same country they actually will become amalgamated in blood, and whether if they do not

amalgamate they will get along amicably together, depend upon circumstances or upon the accidents of history.

In rough outline the picture of the American population as regards racial composition appears to be this: The bulk of the inhabitants belong to one of the great races of mankind — the white. Between the whites and the much smaller number of Negroes comparatively little admixture of blood has taken place for a long time past. For the most part the offspring of such admixture occupy the same social and economic plane as the pure Negro stock: they are classed as Negro. The presence of the two races has been a disadvantage, no doubt, from the standpoint of national strength and prosperity. Nevertheless, through long experience they have learned to live together, to work side by side, in a reasonably efficient economic life. The numbers of the other colored races in the United States are relatively insignificant.

As to the whites, they comprise many different strains. One of these, however, the so-called Anglo-Saxon, has contributed far more to the blood of America than any other, accounting for roughly two fifths of the total white element. In most cases the differences between the several nationalities at the time of their arrival on American shores were superficial rather than fundamental. The surroundings from which they had come were factors more influential than blood. These white peoples have become amalgamated in very considerable measure. In part they have mingled their blood through intermarriage. Still more have they grown together by absorption of a common language and of common customs, education, and ideas. That the amalgamation is by no means complete is the natural result of the rapidity with which immigrants were pouring into the country down to very recent years. The falling off in immigration under present laws will obviously speed up the process of melting.

At the last census very nearly nine tenths of the people of the United States were whites (see Fig. 16, A). Five sixths of the Negroes are found in the South. There they

constitute somewhat less than three tenths of the population. Notwithstanding a considerable northward migration in recent years no state of the North or West (Missouri excepted) has as many as 4 per cent of its inhabitants Negro. Very naturally the white element in the population, fed by streams from foreign shores, has increased more rapidly than the Negro — since 1860 nearly twice as fast. Even the natural increase has been considerably more rapid among the whites. In the decade 1910–1920 the Negroes gained only $6\frac{1}{2}$ per cent in numbers as against a gain (apart from immigration) of about 11 per cent among the whites.

Of the white population at the last census more than three fifths were natives of native parentage, about one fourth were natives with one or both parents foreign-born, and about one seventh were themselves of foreign birth. The proportion of foreign-born has not varied greatly since 1860, for the influx of immigrants has been balanced by the addition of their children, born in America, to those counted in the native population. As some indication of the extent of intermarriage of immigrants with native Americans (often, of course, persons of their own original stock), it may be noted that between 1870 and 1920 the number of persons having one parent foreign-born and the other native multiplied six times.

It is impossible to determine with precision the contributions which different strains of the white race have made to the population of the United States.¹ Very recently, however, careful official estimates have been compiled, in con-

¹ The classes shown in Fig. 16, *D*, are as follows:

I, English and Celtic (Scotch, Welsh, Irish)

II, Germanic (German, Dutch, Flemish)

III, Scandinavian

IV, Latin and Greek derivatives (Italian, Spanish, Portuguese, Greek, Rumanian) except French

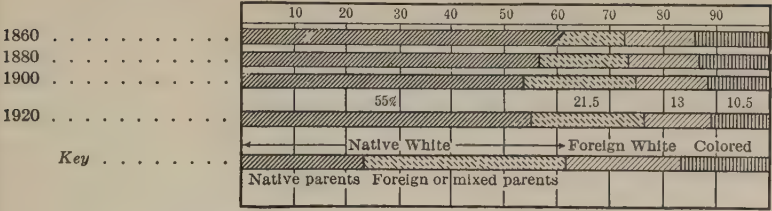
V, Slavic (Russian, Polish, Czech, Serbian, etc.) and Lettic

VI, Hebrew

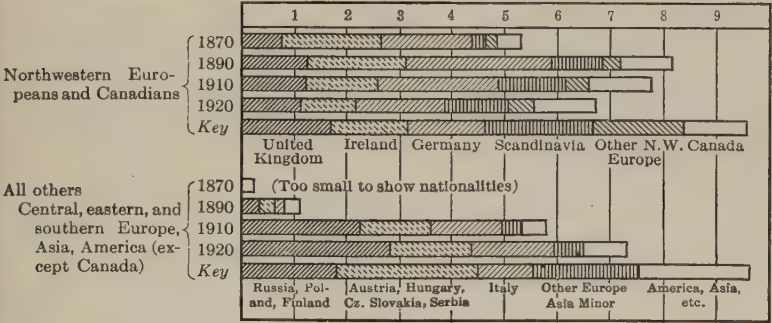
VII A, Mexican and West Indian (too small to show separately except in the last bar)

VII B, All others (largely French-Canadian)

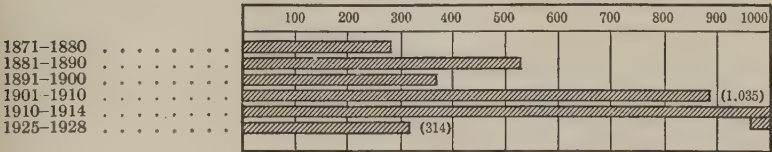
A. PERCENTAGES OF TOTAL POPULATION OF THE UNITED STATES



B. NUMBER OF FOREIGN-BORN IN THE UNITED STATES, IN MILLIONS



C. ANNUAL AVERAGE NUMBER OF IMMIGRANTS, IN THOUSANDS



D. RACIAL COMPOSITION OF SPECIFIED GROUPS, IN PERCENTAGES

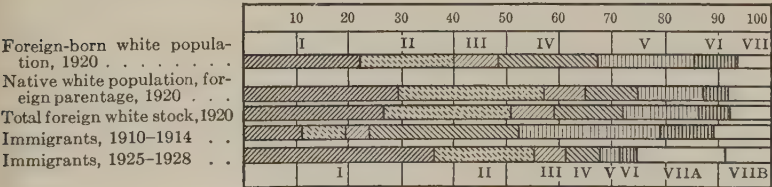


FIG. 16. Diagram showing the composition of the American population and immigration data

In section A the distinction between whites of native and foreign parentage in 1860 is estimated. Section D compares the prewar with the postwar immigration, and both with the foreign white element resident in the United States ; the third bar represents the sum of the two preceding. The racial groups are listed in the footnote on page 124

nection with the assignment of immigration quotas.¹ Of course it was not the thought to classify each person now living in the country as being by origin predominantly of some one nationality; the mixture is far too great to permit this. It was rather to determine what proportion of the

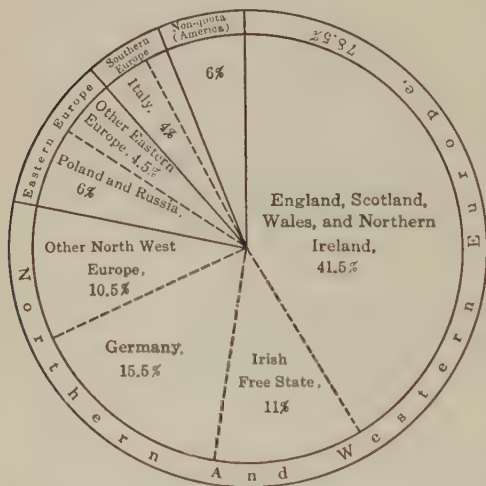


FIG. 17. Diagram showing the racial composition of the American (white) population

This diagram, based on data calculated for the purpose of the new immigration-restriction measure, shows, as regards countries subject to such restriction (quota countries), the estimated proportion of the total blood of the white population derived from persons migrating from the specified countries or groups of countries. The most important non-quota country is Canada, and the immigrants from Canada have been mainly of English, Scotch and French origin

blood in the entire existing population, whether of pure or mixed ancestry, has been contributed by those who came from each foreign country (see Fig. 17).

The English and Scotch, the leaders in exploration and in colonization since the decline of Spain, were the first who settled in large numbers in America. At the time of the adoption of the Constitution they made up about three fourths of the population of the country. From that time down to the present they have continued to contrib-

ute no small stream of immigration. It is estimated that at the present time these strains, with the relatively small

¹ The estimates are based on the statistics of the race or country of birth of arriving immigrants; on census data collected since 1850 regarding the birthplace, and since 1910 also regarding the mother tongue, of the population present in the country; on the census figures of birthplace of fathers and mothers of the native-born; on the apparent nationality of the names recorded at the earlier censuses; and on various other sources of information.

number of Welsh, count for about 45 per cent in the blood of the white population of the United States.¹

Apart from differences in original characteristics, it is but natural that the descendants of those who arrived early in American history should have acquired a certain position of leadership. They exercise in all fields an influence disproportionate to their actual numbers. Those who trace their lineage wholly or chiefly to England, Scotland, and Wales have during all periods played a far greater part than those of any other stock. Among the names of men and women today prominent in government, in business, in finance, in cultural and social life, a very great proportion are English, Scotch, and Welsh. The political institutions and laws of the United States have been molded by English tradition far more than by the traditions of all other countries combined.

If to these stocks be added those from other countries of northwestern Europe, the aggregate makes up about four fifths² of the white people of America. Dominant as were southern and eastern Europeans in the immigration from 1890 to 1920, they account for no very great fraction of the population. From the beginning of settlement to 1890 the bulk of the arriving immigrants came from north of the Alps and Pyrenees and west of the Oder. English, Scotch, Welsh, Irish, German, Dutch, French (mainly coming from Canada), Scandinavian — these strains, because they were the earlier comers if for no other reason, have a part in economic, social, and political life that is altogether controlling, a part that cannot be measured merely by statistics.

The significance of these facts need not be sought in inherent mental or physical superiority claimed for "Nordics" or Anglo-Saxons or Teutons or Celts. What really signifies is that at the time they were pouring forth their sons and daughters into America, as at the present time, the north-

¹ See Fig. 17. The 45 per cent includes the members of these races coming from Canada, shown in the diagram under "Non-quota."

² Including those of such stock immigrating from Canada.

western-European nations were the most efficient, prosperous, and progressive nations of the Old World. We need not inquire the causes that made them so. It is enough that America drew from peoples that were going upward, not from those that were stationary or retrograding; from peoples full of the confidence of success and achievement, not from peoples defeated and discouraged. From them it inherited not only blood but spirit. From them, too, it gained the benefit of long experience in ways of doing things: of performing everyday work in the field or the workshop, of running governments and institutions, of maintaining justice and order.

Moreover, these comers from northern and western Europe were sufficiently homogeneous to amalgamate without much difficulty. There may have been bitter national hostilities among them in their old homes; but they had enough similarity of customs, thoughts, institutions, and ways of producing wealth to enable them to live and work and marry together. They and their descendants might remain for some time more or less English or German or Irish or Swedish in spirit; almost from the beginning, however, they were able to feel a consciousness of kind that made them Americans first and foremost.

The Later Immigration and the New Restrictions

Beginning about 1890 there was a great decrease, not merely relative but absolute, in the influx from northwestern Europe to the United States. Immigration from southern and eastern Europe meanwhile went up by leaps and bounds. In the five years just before the World War that region contributed seven tenths of the total arrivals. The result of this shift in the sources of immigration is conspicuously shown by the census statistics. In 1870, of the total foreign-born population (not including those born in America of foreign parentage) 87 per cent had come from northwestern Europe (Fig. 16, *B*). By 1920 this proportion had fallen to

40 per cent.¹ The corresponding proportion for central and eastern Europe had meanwhile risen from 2 per cent to 33 per cent. Those from southern Europe (principally Italians but with a considerable number of Greeks and others) had been less than 1 per cent of the foreign-born inhabitants in 1870; they were 14 per cent in 1920.

The proportion of persons of northwest-European origin is naturally much larger among the second generation of the foreign stock than among the persons themselves born abroad, because the large migration from northwest Europe antedated that from other sections. The so-called "foreign white stock" includes the foreign-born themselves and their children born in the country (including those with one parent native). It totals nearly two fifths of the entire white population. The racial composition of this group is shown in Fig. 16, *D*. Over one fourth in 1920 were English or Celtic, nearly one third Germanic or Scandinavian, about one seventh Italian, Greek, or of related races, and another seventh of Slavic or Lettic origin.

The gates of the American continent, so long flung wide to comers from every corner of the earth, have now been partly shut. This action was the outgrowth of a sentiment that had been gathering for many years and that was ripened by the World War. Americans had come to realize that even the vast resources of the country might be taxed by a population swelled by ever increasing multitudes from overcrowded Europe. It was feared that war's impoverishment would make the stream larger than ever. Moreover, it was recognized that social and political difficulty was threatened by the change in the character of the immigration movement. The incomers of recent decades had been chiefly of peoples differing widely from the main American stock in habits and in standards of living. It mattered little whether the difference was due to inherent race qualities or to history and environment: the practical effect was much the same.

¹ Germany is counted in the census tables with central Europe, but it is here assigned to northwestern Europe.

The new legislation limits the total volume of immigration and controls its sources. The first "quota law" was enacted in 1921; a much stricter measure was adopted in 1924. As a temporary basis the latter provided that the admissions from any country, subject to certain exceptions, should not exceed 2 per cent of the number born in that country who were present in the United States in 1890. It provided, however, that after July 1, 1929, the quotas should be determined by the calculation, already mentioned, of the proportion contributed by each nationality to the present total white blood of the United States.¹ Immigration from the countries of North and South America is not limited. The total number of admissions from the rest of the world, apart from certain excepted classes, is now limited to 150,000 in any year. This is practically the same total as were admissible under the "2 per cent" provision.

In effect this measure (or any likely to be substituted for it) means that immigration from Europe is now and will continue to be chiefly from the northern and western countries, those countries which, taking history as a whole, have been the major springs of the American population. The difficulties of absorbing newcomers into the national life will thus be reduced to a minimum. The restriction probably serves to hold down, in some measure, even the number who might wish to come from northwestern Europe; certainly the quotas for that region are materially less than the numbers attained in the immigration of several decades ago.

The resulting change in the character of immigration as well as in its total volume is momentous (see Fig. 16, *C* and *D*). During the five years preceding the war, as has already been stated, the excess of arrivals over departures averaged nearly 750,000 annually, whereas from 1926 to 1928 it averaged barely 240,000. Just before the war southern and eastern Europe had been the overwhelmingly dominant source. From 1926 to 1928 (fiscal years) that region

¹ There is discussion of a possible revision of the law to do away with this "national origins" clause.

furnished only about one in eight. The actual number of the net addition to the population coming from southern and eastern Europe averaged nearly 500,000 annually before the war; from 1926 to 1928 (fiscal years) there was no net addition from that region, the number of departures being substantially the same as that of admissions. Of total arrivals from all sources in these three years just about half were from countries not under the quota restriction, chiefly from Canada and Mexico, and most of the remainder came from northwestern Europe.

There is every reason to anticipate that with the sharp cutting-down of immigration the foreign elements in the population will promptly become Americanized. Education, free to every child and eagerly sought by the children of the immigrants, is an immensely important force for assimilation. When amalgamation shall have taken its course it will hardly be possible to speak of the population of the United States as being of more mixed stock than that of most other countries. In few important countries is the population even approximately pure from the ethnographical standpoint. Almost everywhere migrations and conquests have resulted in extensive admixture of blood. In a good many lands, to be sure, this process has not been so conspicuous in recent centuries as earlier.

Meanwhile, in striking contrast with certain foreign countries, the presence of a number of diverse white peoples has been the source of little friction in America. Especially before the war antagonism between nationalities within their borders was a serious element not only of political but also of economic weakness in such countries as Austria, Hungary, Germany, Russia, and Turkey. Rearrangement of boundaries has done much to cure this, though at the cost of multiplying the number of small states, which often lack the essential resources for a prosperous national economy. In the United States there is almost no antagonism on the part of the foreign-born, either toward the native stock or toward foreigners of other nationalities.

Race feeling in certain of the European states was perpetuated by the fact that the several peoples making up the population were isolated geographically. In America the stocks are for the most part widely diffused. The newness of the land has bred a migratory habit; people do not "stay put." This has tended to hasten fusion. It is true that in some of the large cities there are so-called "colonies" of this or that nationality to which new arrivals have flocked. These, however, have not in any great measure held together the second and third generations of the foreign stock. In any case, because the colonies are in cities their denizens are constantly rubbing elbows with the older stock and with other nationalities. These colonies, already meshed in the common life of America, are bound ultimately to disappear.

Most important in determining the effect of the foreign element on the national life is the fact that the great majority fervently wish to become full-fledged Americans. To be sure, a good many of the immigrants of the last decade or two before the war came with the aim of making enough money to enable them to return and set up as petty aristocrats in their native villages; but most of these birds of passage have already left. Of the foreign-born who remain the great majority do not cherish their former language, customs, and ways of thinking. They have renounced Europe for good. The great conflict which so racked and impoverished that continent has made them the less disposed to return. They have cast in their lot with their new home, and their dearest wish is to become full sharers in American life.

SECTION 4. EARLY FACTORS IN THE MOLDING OF NATIONAL CHARACTER

Multifold and intricate have been the factors in the building of the so-called American spirit. Of outstanding importance is the fact that life in the new continent, especially in the earlier days, was not too easy. It took hard work, and work bred efficiency. The climate was even more rigorous

than that to which most of the newcomers had been accustomed. The pioneer could not, like the settler in a tropic land, lie basking under palm trees: he must build a tight shelter and gather fuel to warm it. Food did not grow spontaneously: it had to be wrested from the soil. Fortunately, perhaps, the best of the continent was not the first to be settled. Age-old and tangled forests had to be subdued. From New England's hillsides millions of stones had to be plucked off and piled together. It was no job for the lazy and the shiftless.

Again, settlement here meant conquest of nature, not of natives. There were no Inca cities, no stored-up gold and silver and precious stones to be seized, as in certain parts of America sought by the Spaniard. Nor were there aborigines enough to be set at work piling wealth for the invading white man. The country did not lend itself to exploitation: it demanded development. To be sure, the Southern colonies fell into the mistake of Negro slavery. The result was that the South was for a long time more backward than the North, just as the comparative backwardness of several countries of tropical and subtropical America came from trying to get rich too easily.

It was partly because of the nature of the task that lay before the pioneers of the United States that the immigration was largely that of families, not that of men alone. For that reason and because the Indians were few, and perhaps because something in the spirit of the English and the others who came to these shores rebelled against the mixture of blood, a grave curse under which lie some of the countries of the world has been escaped. The United States has not developed a hybrid race.

Although the comparative difficulty of developing the new land made for hardihood and perseverance, the vision of its ultimate possibilities was an inspiration to the newcomers. The spirit of adventure was always present. It stimulated inventiveness; it bred hope and courage. In the older countries whence the settlers came the gifts of nature were

already pretty well appropriated and utilized. There was little opening for enterprise, little chance for the poor man to grow rich or for the laborer to become the boss. In virgin America all things seemed possible to the man of will. The spur of opportunity brought out the best that was in body and mind.

Somewhat akin to this difference between the Old World and the New was the difference in social conditions. There caste fettered economic life; here caste was largely absent. In the Europe of two or three centuries ago sheer tradition and custom made it all but impossible for a man to escape from the sphere into which he was born; even today he finds it by no means easy there. Once a peasant, always a peasant; once a shopkeeper, always a shopkeeper. And this not merely because other fields were already filled, but because one was not expected to try to enter them. All this was otherwise in America. Class distinctions played some part in the life of the people, but it was entirely proper for a man to aspire out of his class.

The comparative absence of caste, combined with the unwonted opportunities offered by the virgin continent, engendered a new respect for work. Since so much could be achieved by taming natural resources, it was good form to tame them. Physical toil and management of business alike took on dignity. To run a factory was as respectable as to suck rents from inherited acres. The counting-room was as fitting a place as the drawing-room. Business, money-making if one chose so to dub it, became a career as honorable as literature or law or war or politics. For the time being this attitude may perhaps have checked high attainment in the more cultural aspects of life; but it made for economic efficiency, and it has brought such widespread well-being among the people as may fairly be expected to bear fruit ultimately in a high culture.

From the beginning America was characterized by a freedom of the individual in his economic affairs such as had never prevailed even in the most liberal states of Europe.

One reason for this, it may be, was the sparseness of population: the people were scattered over so vast an area that the hand of the government could not be ever over them. Another was the newness of the country: it takes time for government to build up an elaborate system of regulating economic activity. Whatever the reason, the early American was in large measure free to do business after his own will. Private enterprise was intrusted with functions which in Europe were usually claimed by governments; a notable example is the railroads.¹

Again, the gaining of political independence had an important influence on the psychology of the people. It meant not merely that industry and commerce were freed from the various forms of restriction which imperial states so often impose upon their colonies; it meant national self-confidence and national pride. Had the colonies continued indefinitely under British rule, however enlightened, something of enthusiasm would have been lacking in the hearts of Americans. Self-government hastened the pace of economic advance.

These are some of the many causes which have made the people of the United States what they are. They have tended to breed hardihood, courage, diligence, ambition, confidence, initiative, respect for work. All these are important elements in economic efficiency.

Conclusion

Whatever may be the proper method of appraising civilization in general, from the economic standpoint a people must be judged not by the few individuals at the top but in the mass. The capacity of the millions of workers is even more important than that of the captains of industry. But in both respects the economic force of the American people stands very high.

The United States has been fortunate in the sources from which its population has been drawn. Whatever may have

¹ The influence of the freedom of individual initiative is more fully discussed in Chapter V, Section 9.

been the cause — whether inherent racial traits, historical accident, or environment — the white race has become economically the most competent in the world. Northwestern Europe, from which the great bulk of the American population has been derived, has outstripped the rest of Europe. Those who migrated from countries of northwestern Europe were neither the best of their stock nor the worst: they were a fair sample. The proportion of the American population that has come from less favored parts of Europe is comparatively small and, under present legislation, must gradually decline.

Those who came brought with them a rich heritage from Europe's long ages. The American form of government, the institutions, laws, and customs of the people, took their initiation in that part of the world which had achieved the most in economic, political, and social life. The new environment, moreover, was such as to foster those qualities of mind which make for economic efficiency. The well-being due to the rich resources of the country and the energy of its settlers has permitted physical and mental improvement. It has meant advance in health. It has enabled the people to spend liberally for education.

CHAPTER IV

PRIMARY FACTORS IN AMERICAN PROGRESS — NATURAL RESOURCES

In proportion to the number of its inhabitants the United States possesses very great natural resources. Even square mile for square mile it is more richly endowed than most of the countries of the world; and though several of the nations of western and central Europe may surpass it in this respect, they are far more densely populated: the forces of nature working for each of their people are far less mighty. Moreover, the resources of America are highly varied. This diversity is largely a function of the bigness of the country. Nearly everything essential to advanced economic life can be produced within its borders. The consequent exceptional degree of self-sufficiency is a source both of prosperity and of national safety. The good fortune of the American people in possessing a land of such natural wealth is recognized everywhere; this wealth and the character of the population itself are the two fundamental causes of their prosperity and their rapid economic advance.

SECTION 1. THE ABUNDANCE OF LAND

The most important of the natural resources of the United States is the abundance of agricultural land. In view of the fact that soil and climate compare favorably with those of most other parts of the earth, the very moderate density of the population means that a great deal of land capacity is available to produce food and clothing for each of its citizens.

To be sure, very far from all the vast area of the country is fitted for crop production or even for grazing. Somewhat

over half of its total surface, however, is capable of crop production, should there be need to use it for that purpose, and a great deal of the rest is pasture, though of low carrying capacity. It is fortunate that that section of the country which faces Europe and which therefore was first settled is largely fair or even excellent land. The great bulk of the land in the eastern half of the United States is capable of cultivation. There is in the Appalachian region a good deal that is rough, steep, and stony, and in various parts of this territory a good deal that is swampy, but for the most part topography, soil, and climate are favorable. The vast prairies of the Middle West are among the very best agricultural lands of the world. It is only when the center of the country is reached, at approximately the one hundredth meridian (near the center of the Dakotas, Kansas, and Texas), that the situation radically changes. In that part of the great plains lying west of this line rainfall is in large measure cut off by the Rocky Mountain chain. In the mountain territory itself and in the great basin between it and the coast ranges moisture is also deficient. In some of this vast arid and semiarid area, occupying roughly a third of the entire surface of the United States, dry-farming is possible, and in many valleys irrigation brings excellent crops. Much of the land, however, at least at the present stage of agricultural science and practice, is either entirely worthless or is suitable only for grazing. The carrying capacity of the grazing land does not average over one fifth that of even unimproved pasture in the humid sections of the country.

In the strip along the Pacific coast the soil and temperature are highly favorable for agriculture. Toward the north the rainfall is abundant; elsewhere the deficiency can often be made good by irrigation. A new belt of relatively dense population and high prosperity is developing in this Far Western region.

To make accurate statistical comparisons of the agricultural resources of different countries is impossible. Where there is little pressure on the capacity of the land, as in the

United States, adequate information as to its full potentialities is scarcely to be expected. What would be thought very fair land in a crowded country may be held of little worth in one thinly peopled. Much significance, however, attaches to comparisons of the amount of land actually planted to crops in the several countries. If a country has a large amount of crop land per capita, the chances are strong that it also possesses much leeway for further extension of cultivation; where there is little crop land in proportion to the population, it is not likely that much more land exists that could be devoted to this purpose. Moreover, it is to be expected, barring occasional exceptions, that the average quality of the land actually cropped will be better in the one case than in the other. The nation with plentiful land tends to use only the best. In countries like India and Russia the dense crowding of the people forces the planting of much semiarid land, such land as America leaves to pasture or leaves altogether idle.

In Switzerland one may see groups of men and women picking off tons upon tons of rock fallen from some towering cliff, that they may create a scrap of pasture or a tiny field on the steep slope below. Even stony New England never witnessed such patient clearing of the soil, and much of the cultivation there has been abandoned with the opening of the broad Western prairies. In Poland the country roads are so narrow that carts brush the grain as they pass. On the mountain sides all over Europe hang microscopic fields held in place by walls erected with infinite labor; often their soil has been brought from far on man-back or donkey-back. Because it is a bit stony or steep or wet Americans leave unused millions of acres of land which the European or Asiatic farmer would view as a rich asset. Therefore comparison of the acreage of crop land per capita is by no means likely to exaggerate the relative agricultural wealth of America.

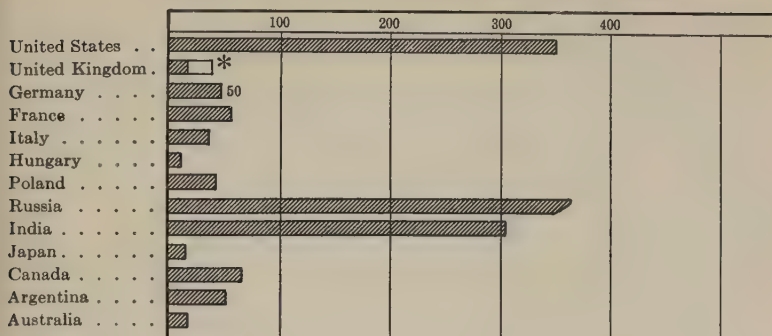
For every man, woman, and child in the United States a little more than three acres of land are pouring forth

wheat, corn, potatoes, cotton, fruits, and other foodstuffs and materials. This is a stretch a mile long and more than twenty-five feet wide. No wonder Americans do not go hungry. Even among countries where the great mass of the population works on the soil — contrasting with one fourth of the total in the United States — we find such ratios as 1.6 acres of crop land per inhabitant in Hungary and Poland and 1.2 acres in the British provinces of India. Russia's crop land is inferior to that of America; but even so there are only about 2.5 acres for each person. In the industrial countries of western Europe the ratios are much lower. In Germany and Italy only about four fifths of an acre is working to raise crops to supply each inhabitant. The United Kingdom is scarcely comparable: for various reasons an exceptionally large part of the land there is devoted to pasture; but even if all the grazing land were turned into crops, the country would have barely an acre per capita. Japan, though pasturing but little live stock, has only the third part of an acre of crop land for each of her people. Conceive the United States with one tenth its present crop area, and you have the picture of the teeming density of the Island Empire. Canada and Argentina are the only major countries which have more crop land in proportion to their population than the United States.¹

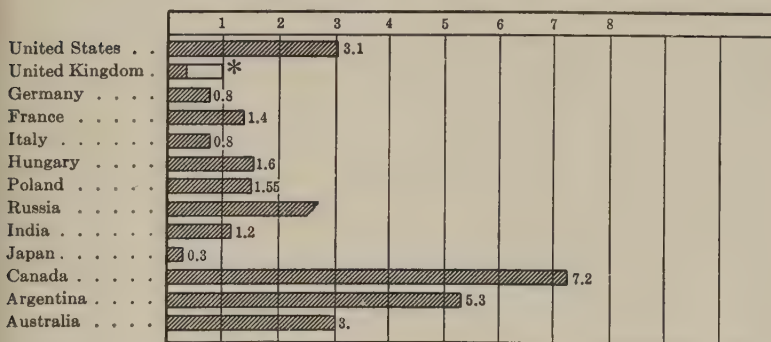
Notwithstanding the abundance of crop land per capita in the United States, such land constitutes less than one fifth of the total area. This fact is far from indicating that the greater fraction of the soil is worthless. In many countries the much higher ratio of crop land to aggregate area results simply from the greater pressure on resources. In several of the European nations from two fifths to three fifths of all the land is planted to crops. The fact that the

¹ Some of these comparisons are approximate only, inasmuch as the definition of crop land varies more or less, especially with respect to hay land and fallow land. The estimate of crop land in the United States varies from about 330,000,000 to 390,000,000 acres according to the basis used; that which is most nearly comparable with the figures for most European countries, which include fallow land but not permanent meadow, is about 350,000,000.

A. TOTAL AREA OF CROP LAND, IN MILLIONS OF ACRES



B. AREA OF CROP LAND PER CAPITA, IN ACRES



C. PERCENTAGES OF LAND AREA CONSISTING OF CROP LAND

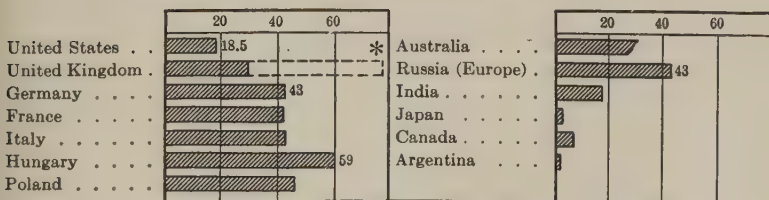


FIG. 18. Diagram showing crop land in typical countries

This diagram shows that in the United States there are about 350,000,000 acres of crop land (section A), which represents about 3.1 acres per inhabitant (section B), and 18.5 per cent of the total area of the country (section C). For India the data cover British provinces only and are only approximate. As to the United Kingdom see text. The figures relate mostly to 1925

* The unshaded section represents pasture, mostly of high carrying capacity.

proportion of crop land in Japan is low is due to the mountainous character of the country. Comparatively low ratios in such countries as Argentina, Canada, Brazil, Australia, and Siberia might be expected by reason of the newness of settlement. The unfavorable climate and soil of vast areas within their borders, however, account in large part for the extremely small figures.

It is difficult to overestimate the effect of these great differences between countries with respect to land resources. America's whole economic life is molded by the abundance of land. It goes far to explain the use to which the land is put, the prevailing methods of agriculture, and the high development of manufacturing industry.

The fact that the United States has so much land enables the people to devote a very large share of it to the production of luxuries and semi-luxuries. There are some poorer countries which, for special reasons, raise commodities of that class for export, using the proceeds to pay for imported articles of prime necessity. In most countries, however, the great part of the soil is employed for basic foods and raw materials that are essential to bare existence. In the United States, apart from land suited only to forests, much that is capable of raising crops is kept under trees, giving abundance of lumber ; apart from land fit only for grazing, great areas of fertile and well-watered soil are devoted to pasture. Moreover, a large fraction of the land actually cropped is used to raise animal feed. Consequently the American people have far more meat and milk in their diet than most others can afford. The more palatable and attractive vegetable foods — fruits and fresh vegetables — are raised more liberally than in most other countries.

Since there is much good land available, American agriculture is for the most part lacking in intensiveness. It would not pay to put too many workers on any given area. For this reason crop yields per acre are relatively low. But production per farm worker is high — far higher than in the overcrowded countries of Europe and Asia. This big output

per man means well-being for the farmers themselves — a standard of living such as the typical Old World peasant scarcely pictures in his rosiest dreams. From the farmer the benefit of abundant land spreads to the entire community. It makes city wages higher. The employer must compete against the strong bid of the soil.

More than all this, the abundance of land in America has determined largely the direction of its economic history and determines the present character of its economic activity. Where land is scarce its cultivation, in the case of most countries, is overwhelmingly the major industry. Abundance of land means that a fraction of the inhabitants can produce on it enough to feed and clothe the whole people. With a population of a given standard of efficiency the less land there is, the more of the workers of the country have to toil to wrest enough from it. In the United States barely a fourth of the population is needed to till the soil. With their large output the farmers can buy many elaborated goods. For this reason, combined with the fact that the country possesses rich resources of power and of minerals, the United States has almost as many workers in factories as on farms. The high development of transportation, of distribution, and of professional and personal services for the health, comfort, instruction, and recreation of the people follow in the same train.

The countries of eastern Europe and eastern Asia stand in striking contrast.¹ In Poland, Russia, China, and India from two thirds to five sixths of all the inhabitants live on the land. Overcrowded as they are they can afford in only small measure the luxury of factory industry at home or of the import of manufactured goods. Different only in degree is the situation in such countries as Italy and France. These, by better fortune than their neighbors farther east, did not become densely populated until after their people had made fair progress in agricultural methods and in the industrial arts. They are able to maintain a considerable manufactur-

¹ For distribution of occupations in typical countries see Fig. 31 (p. 268).

ing industry. Still, these countries lag very much behind the United States in this respect.

It must not be supposed, to be sure, that abundance of land is the sole reason why only a small proportion of the American people is required to supply generously the agricultural needs of the nation, or that scarcity of land is the sole reason for the backwardness of many other countries. The character of the people, the traditions of farming, the system of land tenure, the nature of the existing government and of the governments of the past, and various other causal factors are at work. It would be possible, by modern scientific methods and adequate use of capital, especially in the form of machinery and mechanical power, for many a country, with half as many people as are now employed, to win from its soil as much as it does today. Those thus set free could, were conditions favorable, turn to the elaboration of goods and thus advance the standards of living. But there is a profound inertia in the economic life of the older nations. Change encounters great friction.

The leaders of a nation may be familiar enough with methods of cutting down the amount of human labor on the land. But, they ask, what will become of the workers thus thrown out of jobs? That they ask this question may be due to the fact that they attempt to visualize the process of shifting into other industries as a sudden rather than a gradual thing. It may reflect the knowledge that the country lacks certain resources essential for industrial development. For the most part, however, such an attitude rests on recognition of the difficulty of changing long-established economic and social levels and methods. A major factor in the efficiency of American agriculture lies in its relative, although, of course, by no means complete, freedom from outworn tradition. The contrast between the thickly peopled fields of Europe and the immense spaces confronting the settlers struck off their ancient shackles. It thus came about that large use of machinery to save human labor on the farm was first developed in America. Although the farmers of west-

ern Europe too have broken some new paths, although indeed in a few respects they may be ahead of those of the United States, yet even there agriculture is too much tied to by-gone centuries. In eastern Europe and Asia the hand of the past is heavy.

Two types of countries constitute exceptions to the general principle that manufacturing industry is proportional to agricultural resources. On the one hand there are the few primarily industrial countries which rely on import of food and raw materials, and on the other the few newly settled countries which, at least as yet, confine themselves largely to agriculture and grazing and import manufactured goods.

The first group comprises England, Belgium, and Germany. The first two import not far from two thirds of their food supply; Germany, about a fifth or a sixth of hers. All three are dependent on the outside world for the great bulk of the textile materials they require. The huge volume of indispensable imports is paid for with the products of mines and especially of factories. It is not impossible for a country with enough capital and enough skill of brain and hand to live comfortably in this manner; but such an economic life is far less to be desired than one of national self-sufficiency. It means vast and complex trading operations across national boundaries and over wide seas. Transportation charges eat into the product of industry. Trade is subject to all manner of artificial hindrances: tariffs, export duties, embargoes, inspections, and formalities. Worse still, war may throw up its barriers, even perhaps cut off trade entirely. A country not able to support itself with food, the most basic of all necessities, lies under constant menace. The late war emphasized this as never before. England was all but prostrated by the submarine. Germany was starved into capitulation as much as she was whipped into it. Countries in this exposed position have to cut deep into their national income for national safety. England's fleet and Germany's army ate up billions even before the final conflict laid its scourge upon the straining back of the taxpayer.

It is fortunate, not only for itself but also for the countries of northwestern Europe, that the United States has not been obliged to join the ranks of nations dependent on foreign trade for the very means of subsistence. Great and growing as is the demand for manufactured goods, the markets open for the industrial nations are not unlimited. What comes to the same thing, the regions with surplus food and raw materials to spare for overcrowded industrial states are by no means boundless. Any nation not already in the game of trading elaborated goods for food finds it hard to enter. Even a country with such rich resources of power and minerals and of such high productive efficiency as the United States would inevitably see its standard of living sink should it become tributary to the outside world for any great part of its basic requirements.

Canada, Australia, and New Zealand are countries at the other extreme. They maintain a high standard of living, although they have as yet no very highly developed factory industry. Their position in this respect is partly due to relative inadequacy of certain natural resources needed for a varied and advanced manufacturing industry, and partly merely to the newness of their settlement. Another reason, however, is the fact that land is so exceptionally abundant and cheap that it may be advantageous, for the time being, to devote national effort chiefly to crops and live stock, and with these to buy from abroad the more advanced products. Argentina is in the same position save that her people are somewhat less efficient in their use of the land. The United States in its early history was in much the same situation as are these new countries. The chief disadvantage of this type of economy is the possibility of interruption of trade by artificial barriers or by war. The risk in this respect is far less serious than for the industrial country, because the commodities required from abroad are of less essential character.

Taking it all together, the United States has the nicest balance in its economic activity to be found anywhere in

the world. Thanks largely to its rich agricultural resources and the fact that they are not taxed by overpopulation, the country has at the same time relatively well-to-do farmers and many prosperous industrial workers. It depends but little on the outside world either for food and raw materials or for manufactured goods. Abundance of land is thus a tremendous factor in American well-being.

SECTION 2. AGRICULTURAL RESOURCES AND FUTURE GROWTH OF POPULATION

As has already been stated (see Chapter III, Section 2), many thoughtful observers have viewed with concern the rapid multiplication of population in America. They have feared its entrance on the path trod by so many countries of the Old World. With further growth in numbers they have pictured a sliding-down in standards of living, or dependence on imported food and raw materials, or both. The question is not to be dismissed lightly. The American people are not justified in shutting their eyes to the possible threat to their future. On the whole, however, the prospect seems by no means dark. With an intelligent policy the United States ought to be able to stave off for a long time, if not indefinitely, the clutch of hunger. Increase in population in time to come must be a matter largely of speculation, but we have seen reasons for believing that it will probably be less rapid than in the past. On the other hand, the farm lands of the United States offer room for great expansion of output. Improvement of methods of production and greater application of capital promise much.

It is true that the situation is very different from that of half a century or more ago. The splendid lands of the Middle West, largely virgin then, have all been taken into farms, and the greater fraction brought under the plow. The process had, indeed, gone far by the close of the last century. The lands then unappropriated offered much less attraction to the pioneer. With the steady increase of population the

amount of land planted to crops has fallen from 3.7 acres per inhabitant in 1900 to 3 acres at the present time.

Nevertheless analysis of the country's land resources (see Chapter VIII) makes it clear that there is wide leeway for extension of crop area. As the prairies were opened up, much land farther east was abandoned; this can again be brought into production. Vast expanses of pasture and woodland and of cut-over, marshy, stony, and semiarid land can be made productive by adequate investment of capital. Capital is accumulating year by year; when it pays to devote more of it to developing lands, great amounts will be available. Even though much of the land now uncultivated is inferior in quality, thorough and intelligent farming can make it produce yields at least equal to those now secured by rather superficial methods from the better lands. Output per man need not necessarily fall as the crop area is extended. If need be, the United States can readily afford to cut down its consumption of lumber and paper to make way for production of food. A great deal, too, is to be gained from the application of more capital on the lands already cropped. More under-drainage, deeper plowing (especially by mechanical power), and greater outlay for fertilizers will bring bigger yields.

Most of all may be expected from scientific research and the spread of knowledge among farmers. The harvest from the past efforts of the nation and the states in this direction is only beginning. It takes time for the discoveries of the experiment station and the laboratory to filter down to the millions of tillers of the soil. Better adaptation of crops to soil and climate; better rotation; greater care in the selection of seed; more scientific use of fertilizers; more efficient rationing of animals,—all these and other avenues for increasing output lie open. Apart from special agricultural instruction and research, the abundant and expanding facilities for education of more general character are building an ever more competent body of farmers. The tendency of education and research is cumulative.

The progress already achieved in methods of farming is highly encouraging. One need not go back to the days before the mowing machine, the reaper, and the mechanical drill. Recent decades show increasing output per acre and per man. We have seen in Chapter II, Section 5, that weighted quantitative indexes of the combined output of crops and animal products on the farms show an increase of about 56 per cent between the beginning of the twentieth century and 1927. This has been accomplished with the addition of barely 20 per cent to the amount of land under the plow, and with no increase whatever in the number of workers on the farms.

More detailed statistical facts confirm this broad generalization. According to the census, crop production in 1909 was 10 per cent greater than in 1899, and in 1919 a further gain of 9 per cent appeared, whereas there were very few more farm workers at the end of the twenty-year period than at the beginning. Figures for individual years, however, are not always representative. Comparing groups of years, the indexes of annual production of ten major crops, based on the crop estimates of the Department of Agriculture, show an increase of 35 to 40 per cent since the beginning of the century. These are figures for vegetable products of the farms. The increase in animal products, in conformity with the demand for a more agreeable diet, has been much more marked. The gain in respect to such products has been brought about less by adding to the area used for pasture than by improvement in the quality of the pasture and, above all, in the quality of the animals and in the methods of feeding them.

Statistics of yields per acre of individual crops are likewise of promise. The fact that yields are much higher in northwestern Europe than in America indicates that, when it shall become profitable to employ capital as liberally as those crowded countries must do, the output per unit of land can be increased here without necessarily devoting more labor to the soil. So, too, there has been an increase

in yields in America itself without the application of more human labor. This improvement is obscured in the averages for the country as a whole by the extension of cultivation into less well-watered areas, where output is naturally low. A comparison for the states east of the Mississippi is more significant. An index for that region has been compiled based on the yields per acre, duly weighted, of the several cereals, potatoes, and hay.¹

INDEX OF YIELDS PER ACRE
(1866 TAKEN AS 100)

1866-1875	102
1876-1885	104
1886-1895	98
1896-1905	108
1906-1915	116
1916-1920	121
1921-1925	117
1926-1927	120½

This comparison shows for the years 1926 and 1927 a gain of nearly one fifth in yields as compared with 1866-1875. The falling off in the index for the period 1921-1925, like that for 1886-1895, was largely due to the fact that during much of the time prices of farm products were unduly low. By making farming relatively unprofitable they discouraged care, and especially discouraged expenditure, in cultivation. Besides, the year 1921 was one of exceptionally unfavorable weather conditions.

Similarly, statistics might be multiplied to show the advance in methods of raising live stock and of producing dairy and poultry products. The annual output of meat increases with little or no addition to the number of meat animals kept on the farms and with less than corresponding increase in the quantity of feed used. Hogs and sheep and cattle are made to take on weight faster and thus come to market at an earlier age. The average amount of milk per

¹ Computed on the basis of the annual crop estimates of the Department of Agriculture by G. F. Warren, in "Farm Economics," Bulletin of the New York State College of Agriculture, January, 1928.

cow has been much augmented by improvement of breeds and by more scientific feeding and care.

It is true that the gain in agricultural production per person working on the farms has been more conspicuous than the gain in output per unit of land in use. Each man handles more land than formerly. Increase in output per man would not ultimately solve the problem of pressure of population on land resources if the limit of output per acre had been reached. But the fact that American farmers have been able thus to augment their per capita production has nevertheless a distinct bearing on the problem of the sufficiency of the resources of the country for future needs. It shows the possibilities of improvement in methods. Hitherto, because land was so abundant, progress has been sought largely in the direction of enabling each worker to operate a larger area. When there is less room for lateral expansion, brain power and capital can be applied more vigorously to getting more out of a given surface.

Apart from the possibility of caring for a much larger population by extension of crop area and by adding to output per acre, the land can be made to support greater numbers by reasonable changes in the diet of the people. Adjustment in this direction need not mean a less sufficient or less attractive table. Americans have no desire to imitate those overcrowded peoples who manage to eke out subsistence by cutting down the variety of food till a great part of the pleasure in eating is lost. But neither pleasure nor health is promoted by too much or too rich food. Not a little can be saved by more intelligent choice and by avoiding waste. Under the stimulus of war enthusiasm the people of the United States went no little distance in this path. They have by no means forgotten all the lessons they then learned. The American diet is more economical than it was a decade or two back, but it is quite as good or even better.

Reference has already been made to the great area at present devoted to the production of meat. It takes four or five times as much land to produce a given number of

food calories in the form of meat as in the form of grain or vegetables. Most human beings seem to be healthier and stronger for a reasonable amount of meat in the diet; but it is very questionable whether eating so much meat as the English, the Australians, and the Americans do is particularly beneficial. A moderate reduction in the per capita consumption of meat would in itself enable the soil of the United States to maintain many millions more people.

The future is likely to witness also a marked decrease in the demand upon the land for feed for work animals. Already the almost complete disappearance of the horse in American cities has greatly reduced the consumption of hay, oats, and corn. Mechanical power is being used in ever increasing volume on the farms themselves; the number of horses and mules on farms fell about 12 per cent between 1920 and 1925. Future developments in this field are not easy to forecast. Much depends upon the availability of fuels suitable for the internal-combustion engine. With such supplies permanently assured, most of the horses and mules could be banished and a vast area could thus be set free to raise products for human use.

Finally, in considering the ability of the United States to support a greater population it should be borne in mind that it now has a large agricultural surplus. About one seventh of all its farm produce is sold abroad. Indeed, of late the complaint of the farmer has been that his surplus output was going begging. With the growing competition of newer countries, especially Canada, he has found the prices of his export products during much of the time too low for profit. For the time being it is hard on the American farmers (at least certain groups of them) to be in a position to produce overabundantly; but from the point of view of the nation as a whole, and even indeed from that of the tillers of the soil as well, surplus capacity is greatly to be preferred to deficient capacity. If need be the number of farm workers can, for the time being, be cut down further till increase in total population makes renewed expansion

of agriculture necessary. Far more fortunate is the country with reserves of land at its call than the country forced to till every scrap of its surface to escape starvation. One of the chief planks in the national platform of the American people should be the preservation of that happy balance between land and the number of mouths to feed that has contributed so greatly in the past to the prosperity of both city dwellers and farm dwellers. It is chiefly because of its rich agricultural resources that the United States may look forward with confidence to the future ; otherwise it might well fear an ultimate fall in living standards — a descent toward the level of the Russian peasant and the Chinese coolie.

SECTION 3. VARIETY OF SOIL AND CLIMATE

The agricultural resources of the United States are not only great but varied. Diversity of soil and climate makes possible the production of many kinds of foodstuffs and raw materials ; it is thus an important factor in promoting national self-sufficiency.

It is true that variety in land resources is less essential than abundance. On an average soil in an average temperate climate a good many different food crops can be raised, giving no little range of diet. Witness the diversified products of countries of smaller area and relatively uniform climate, such as Germany or France or England. Nevertheless a nation of greater size and with a more varied soil and climate has naturally an even wider range of food products at its command. And this is still more true of textile and other vegetable and animal raw materials : physical conditions are often rigidly determining factors in the production of these.

The mere vastness of the United States carries with it much diversity of climate. It is true that east of the Rockies the variety is less than appears in many areas of similar size in other parts of the world. The absence of high mountains makes for uniformity. None the less, the distances are

so great that temperature varies materially even within the main land mass. Florida, the Pacific coast, and the irrigated valleys of the Southwest have agricultural conditions widely different from those characteristic of the temperate zone.

There are in the United States three crops of enormous importance which few other countries are so well fitted to produce. These are cotton, corn, and tobacco. In no other single country are all three produced in large quantities. At present only three or four countries outside the United States raise cotton in significant volume. Practically none grows in Europe. Corn requires the combination of a moist planting season, warm nights, and a hot, sunny, and comparatively dry ripening period. Northwestern and central Europe lack such a ripening season. Where the conditions are favorable, as in the United States, southeastern Europe, Argentina, and South Africa, corn is a peculiarly useful crop; the food value obtainable per acre is decidedly greater than with other cereals. As for tobacco, it too demands much sunshine. Its flavor varies much with apparently minor differences in soil and weather conditions. Most of Europe has failed to raise tobacco that appeals to the capricious taste of smokers.

The United States raises a greater diversity of useful fruits than any other country. It has all the temperate-zone fruits and many of the semitropical. Few countries present such a range of soil and climate as will grow the apple, the peach, the grape, the melon, and the orange. Florida and the Pacific coast have fruit-bearing trees and vines in almost bewildering variety. Equally diverse are the green vegetables afforded by American soil and climate. The moist warmth of the South Atlantic seaboard furnishes early vegetable delicacies such as in most European countries appear only much later in the year.

It is true that the United States imports many hundreds of millions of dollars' worth of agricultural products each year. For the most part, however, the articles brought from abroad can scarcely be classed as necessities of life in any

such sense of that phrase as is understood by most of the peoples of the world. Moreover, in a number of instances importation is not due to the unfitness of the American soil and climate to produce the given commodity. Sugar and silk, for example, are sought from foreign shores rather because they demand a great amount of hand labor, and labor in the United States is dear as compared with capital. Only by reason of the very high standard of living of the people are the imports of truly exotic products, such as rubber and coffee, so heavy.

SECTION 4. FOREST RESOURCES

Agriculture supplies the two most insistent of human wants, food and clothing. The closely related forest industry is a major contributor — in America probably still the dominant contributor — in providing the scarcely less indispensable shelter. Wood has the great advantage that it makes construction quick and easy. In a new and rapidly developing country an abundance of this easily handled material is a great asset; without it a much larger fraction of the time of the busy community-builders would have to go into the erecting of homes and other structures. Even in older stages of national development, when more enduring materials are preferred for basic construction work, there is still a large need for wood in the trimming of buildings as well as in furniture, packing cases, and a multitude of other uses. With the enormous expansion of printing, a new and heavy demand has arisen for wood as material for paper.

Almost any land that can raise crops can also raise trees. Even where agriculture is impracticable, there is usually the alternative between grazing and forestry. Hence as population grows in density the question of wood resources resolves itself substantially into the question how much land can be spared from agricultural or pastoral use. In a new country, however, the abundance or paucity of forests has a quite different economic significance. Virgin forests, grown

without man's effort or choice, are very similar to the underground riches of the mine. They are a free, though exhaustible, gift of nature.

The original forest area of the United States was more than eight hundred million acres. The greater part of the region from the Atlantic to the Mississippi was wooded. When settlers first came the forests were more a liability than an asset. Clearing, at great labor, was needed to make room for the tilling of the soil. Curtailment of forest resources was essential. Yet it is unfortunate that, even after the opening of the prairies had brought vast areas ready for the plow, the habit of wasting wood long persisted; indeed, it has by no means entirely ceased today. The methods of cutting often left much valuable material unutilized. A great fraction of the cut-over lands has neither been prepared for proper agriculture or pasture nor reforested with good stock. Many millions of acres have been left to grow up to brush and inferior trees. Forest fires, still far too common, have destroyed immensely valuable resources.

Notwithstanding great depletion of the original wooded areas, the United States still has larger reserves of standing timber than any other country except Russia (European and Asiatic together) and possibly Brazil. The proportion of its area forested remains higher than in most European countries, higher than in any of the densely peopled parts of the world. It has more than 450,000,000 acres in trees, nearly a quarter of the entire land surface of the country. Of the total about 250,000,000 acres are classed as growing saw timber, considerably over half of this being virgin growth and the rest cut-over land that is reforesting itself with fairly satisfactory stock. The remainder of the forest area is suitable only for producing firewood or, in some cases, paper stock, and a considerable fraction of it is not restocking; that is, the annual growth does not exceed the loss by decay. It is noteworthy that the United States no longer has an adequate supply of the kinds of trees best suited for paper-making; it imports large and ever increasing quantities of

paper and paper stock from Canada. Nevertheless, considered as an entirety, the forest resources are still very rich. It is only because consumption of wood so greatly exceeds that in the older countries that the annual cut exceeds the annual growth. Even were the people under no compulsion in the matter, they would presumably reduce the per capita use of lumber as the country gets older. A community that has passed the heyday of pioneering and rapid multiplication of numbers prefers the more costly, more toil-demanding, and at the same time more enduring building materials. On the other hand, the demand for paper is likely to increase. There is reason to believe that with care and reasonable expenditure of capital in planting and caring for trees, the country can supply any reasonable demand for lumber and paper from an area considerably less than is now occupied by forests.

In any case the abundance of wood which has been enjoyed hitherto has been a very important factor in the development and prosperity of the nation. It has made construction easy and cheap. As the forests of one region after another have become depleted, the efficiency of the transportation system has brought into use those of more and more remote sections. The railroads haul immense quantities of lumber from the splendid forests of the Pacific coast far toward the East; a good deal even comes all the way to the Atlantic seaboard. Recently the Panama Canal has become a great highway for the intercoastal movement of lumber.

The United States has had, and still has, wood not only cheap but also of high grade and wide variety. It has several excellent soft woods easily worked and of good lasting quality, and several beautiful and long-enduring hard woods. Only because of the wealth and exacting tastes of the people is any wood imported, even for cabinetwork and other elegant uses. White pine, Southern pine, cypress, Western pine, Douglas fir, redwood, oak, hickory, ash, birch, gum, are but the chief among many fine woods which the far-flung virgin forests have put at the disposal of Americans. In few countries is there such variety.

SECTION 5. POWER RESOURCES

This is the age of mechanical power. In no other respect does the industry of today differ so greatly from that of two millenniums ago or even of two centuries ago as in the use of this tireless servant. In both the physical and the economic sense "power" includes not only the energy that actuates machinery but also the energy that takes the form of "process" heat in industry and even of domestic heat. Without the enormous aid to human effort afforded by such power, men would have to spend all their time in providing little more than the bare necessities of life. The processes of agriculture and the processes of preparing food and of making the simpler textiles can, if necessary, be performed by man's muscles or with the aid of animal power alone; so can short-distance transportation; but many of the advanced commodities of modern consumption, indeed most, either could not be made at all, or could be made only in insignificant volume, without the far greater force of steam, of explosive gases, and of falling water to drive machinery, and of heat to smelt metals and perform a multitude of other tasks. Long-distance transportation of goods, which makes possible the full utilization of the resources of a country and of the world community of countries, is likewise dependent on steam and electricity. Without mechanical power each little locality would have to make itself substantially self-sufficient.

If society is to maintain its present standards of well-being, to say nothing of advancing them, still greater reliance on mechanical power will be requisite in the future. As population becomes more dense it will take more power to wrest from the land enough food and raw materials. It will become desirable also to substitute mechanical force more and more for that of work animals, the feeding of which claims a big fraction of soil resources. So, too, as the more easily accessible mineral deposits become depleted more power will be needed for deeper and more difficult mining and more heat

for the extraction of metals from lower-grade ores. Wider distribution of population and industry would demand a greater volume of transportation even were there no increase in production of manufactured goods per capita.

In fact, unless some wholly revolutionary discovery shall unlock new forces of nature, the available power supply, rather than any other factor, is likely to prove that which sets bounds to future progress. Although certain of the present sources of power are to all intents and purposes inexhaustible, those on which the world chiefly relies are most emphatically exhaustible. The only unwasting force used on a large scale at the present stage of science and technique is that of falling water. To put water at work as it makes its round from sea to mountain and from mountain to sea in no way checks the flow. Winds and tides are also inexhaustible, but it takes enormous investment to harness much of their strength, and at present they play very little part in the supply of power. Some day efficient and economical methods may be devised for drawing energy directly from the sun's rays or from the disintegration of atoms. But man can rest in no blind faith in such a happy solution of the power problem. In the meantime he is enjoying, at least for a few centuries, the enormous blessing of the mineral fuels, the crystallized product of millions of years laid away in underground treasure chambers. In a year the race burns up what it took centuries to create. "A rational view of our stores of mineral fuels would regard them as a bonus to be used in acquiring the skill and in building the engineering works needed to harness the inexhaustible sources of power."¹

We shall learn in a subsequent chapter that, on the assumption that all fuels should be turned into power by means of boilers and engines of average efficiency, these fuels, together with the actually harnessed water powers, would give the United States the equivalent of two horsepower,

¹ Fred G. Tryon and Lida Mann, in "Population Problems in the United States and Canada" (1926), p. 137.

working eight hours a day and three hundred days or more a year, for each man, woman, and child in the population. We shall learn that no other country uses mechanical power to such an extent as the United States, and that the expansion in the application of power has been far more rapid here than that in the population. This constant lengthening of man's arm by the forces of nature has been a major factor in the ever increasing per capita output of industry; and it has been possible because the fundamental sources of power in America are abundant and cheap. As yet the country has had to use only the cream of its power resources: it has had to bring into service only the water powers that could be cheaply harnessed, only the coal and the oil that could be easily extracted.

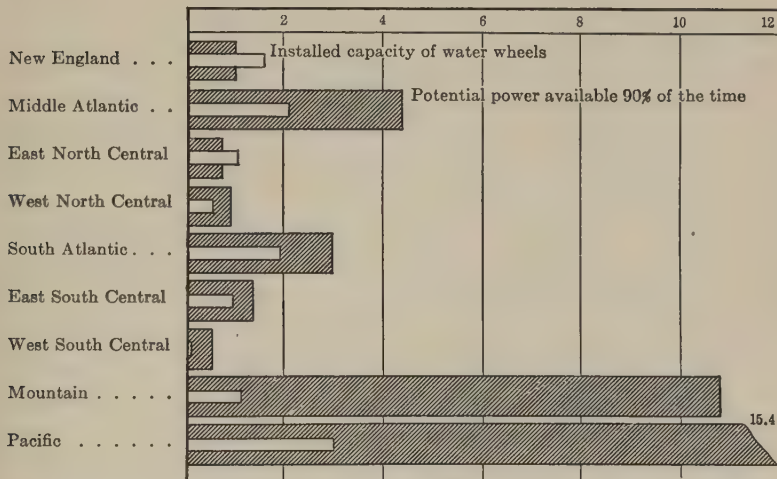
Water Power

It may not always be so simple a problem for the United States to provide these mighty aids to human effort as it is today. About nine tenths of the power used in the country is produced by fuel drawn from strictly fixed stores underground. Water power is capable of much further development, but it can never come near to providing all the needed power.

The evaluation of a country's water-power resources must take irregularity of flow into account. Niagara is fed by a vast drainage area with precipitation well distributed through the year and with no lofty mountains to hasten the run-off. It is backed by the enormous reservoir of the Great Lakes. It thus hurls down its flood with but little change in volume. But a mountain torrent discharges many times as much one day as the next. Even a considerable river may carry several times as much water in the heaviest month of the year as in the lightest. For practical commercial purposes the amount of power available from the stream depends upon how much capital it pays to invest, under given circumstances, in installing water wheels capable of using more than the minimum flow and in damming flood

waters so as to smooth out the irregularities. The dearer are coal and other fuels, the greater the part of the theoretical power of the streams that can profitably be put to work.

A. MILLIONS OF HORSEPOWER, 1928



B. MILLIONS OF DEVELOPED HORSEPOWER: UNITED STATES TOTAL

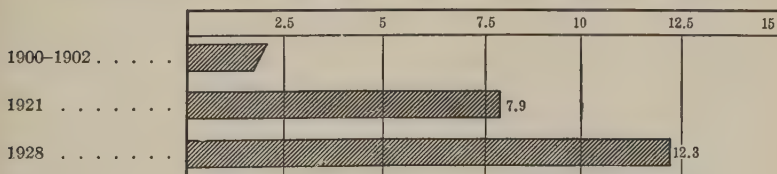


FIG. 19. Diagram showing water power in the United States

See text as to the relationship between installed capacity of water wheels and the normal amount of power available. The geographic divisions differ widely as to the extent to which the potential resources have been utilized. The data relate to the beginning of 1928, and are changing materially from year to year

The United States Geological Survey has recently published a revised estimate of the potential water power of the United States, distinguishing the power available 50 per cent of the time and the power available, with reasonable expenditure for storage reservoirs, 90 per cent of the time. The former amount, of course much the larger, is about 59,000,000

horsepower ; the latter, which may for convenience be called the resources at minimum flow, is 38,000,000.

How do these figures of potential water power compare with the aggregate present and future needs of the United States? At the present time the total consumption of mineral fuels and water energy for mechanical motive power and for industrial and domestic heat is the equivalent of about nine hundred and fifty million tons of coal annually. The water powers at present developed contribute about one sixteenth of this total. It is estimated (see next page) that the potential energy of all streams in the country is some five or six times greater than that of the streams already harnessed. If by some legerdemain all this potential capacity could be instantly brought into service, it would supply approximately one third of the present demand for heat and power ; it would be sufficient, however, to replace most of the steam engines if the task of furnishing industrial and other heat were left to fuels.

But the total demand for heat and power is likely to increase at a rapid pace. The aggregate use of mineral fuels and water energy at present is about double that of two decades ago, and another doubling of the requirements may readily come before 1950. The proportion of the total needs of that day which could with reasonable investment be supplied from the falling waters is not likely to exceed one sixth, and later on the requirements will expand still further.

Therefore, even if there were no difficulty involved in transmitting water energy to the places where power and heat are wanted, the streams can never contribute more than a relatively modest fraction of the total needs of the United States. None the less they constitute a resource of immense value, especially in view of the fact that a great part of the water power is found in regions which are more or less lacking in coal. About two thirds of the aggregate potential stream-power is in the Rocky Mountain and Pacific-coast areas, in much of which coal is relatively inaccessible. Other great stores of energy are found

in the waterfalls along the Appalachian chain, notably in Maine, New York, Pennsylvania, and the states stretching thence southward to Georgia, Tennessee, and Alabama.

The actual exploitation of the water-power resources of the United States has proceeded rapidly in recent years. The installed capacity of water wheels in 1929 was over 50 per cent greater than in 1924, only five years before. The aggregate development in the year 1929 amounted to about 13,570,000 horsepower. This is over one third of the potential capacity on the basis of minimum flow, but that fraction does not correctly represent the degree to which the resources have been brought into use. The capacity of the actual installations at many sites is much

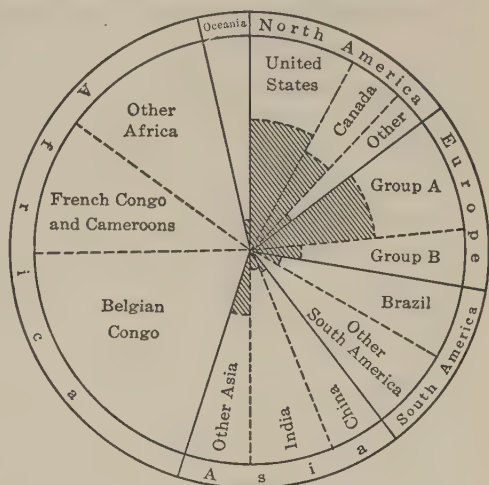


FIG. 20. Diagram showing the world's water-power resources

This diagram, based in large part on very rough estimates, shows the share of each continent or major country in the total world resources, developed or undeveloped, while the part of each sector shaded shows the proportion of the resources already harnessed (more strictly speaking, the ratio of the installed capacity of water wheels to the potential resources; in a country with all resources developed the installed capacity would normally much exceed the normal-flow power available). In some countries there is a development too small to be shown. In Europe the countries designated as Group A include Sweden, Germany, Czechoslovakia, Austria, Italy, and all those farther west; Group B represents the countries to the east of this line. Most of the developed water power of Asia is in Japan

more than would be sufficient to care for the minimum flow, the plants often relying on steam to supplement the output when the water is low. Hence it is calculated that only from one fifth to one sixth of the potential flow of the streams has yet been harnessed. Naturally the proportion is much higher than this in the older sections of the country, in

some of which the capacity of installed wheels already exceeds the minimum-flow power available, but it is much lower in the Far West.

The United States compares very favorably with most countries of the world as regards water-power resources, but it has no such predominance as in coal and petroleum. Estimates for the less advanced countries are far from accurate. Roughly speaking, the United States possesses 8 per cent of the potential total of the world. It is believed that the Belgian Congo and the French Congo (with the Cameroons) in the far-away heart of Africa, are the only countries that can boast greater resources. Other countries with vast potential water energy but as yet little development of power plants are Brazil, China, and India. Norway, Sweden, and Switzerland have very great resources in proportion to their area. Many of the nations of Europe are richly endowed, though England, Belgium, and Germany, the three most highly industrialized countries, have only limited water-power resources, as is true also of the great area of European Russia outside the Caucasus region.

As regards the amount of water power actually put to work at the present time, the United States leads the world in absolute volume. Its installed capacity is fully one third of the total of the world. The country which ranks second is Canada, with about five million horsepower in use and with aggregate potential resources about half as great as the United States possesses. In proportion to its population Canada has much more water power under harness than the United States has, and the same is true of Norway, Sweden, and Switzerland. It must be borne in mind that these four countries have little or no coal and are under pressure to develop their water powers. The same is true of Italy, which has more installed capacity than any other country of Europe, though less per capita than the United States.

Coal

Of mineral fuels, by far the major source of mechanical power and artificial heat throughout the world, the resources of the United States are (so far as the geologists are now able to tell us) quite without peer. As with other minerals, the question here is not how much can be produced annually ; it is rather how long the deposits will last and how the cost of extraction will be affected as depletion goes on. After a certain time unit costs tend to rise. In the case of coal there comes the necessity of descending to deeper levels, of working thinner veins, of taking out lower-grade fuel. The ever growing difficulties may be combated by improvement in technique, but ultimately they are bound to win.

Estimates of coal reserves vary more or less according to opinions as to what proportion of the coal that is known to exist in the earth will ever be worth mining at all. It is believed that at the present rate of consumption the deposits of this country will last several thousand years. In comparison with Europe such a store seems almost boundless. The richest deposits there — those of Great Britain, Germany, northern France, Poland, and Russia — will at the outside last but a few hundred years. In those countries depletion has already reached the stage at which, in spite of advance in technical methods, daily output per miner is stationary or even declining. In the United States, on the other hand, improved methods applied to the still largely virgin deposits bring a steady gain in output per man (that is, of bituminous coal, gain no longer appearing in the case of anthracite) and herein lies a great advantage for American manufacturing, mining, and transportation. Most of the European countries have coal resources by no means comparable with the five just named, and several have to import practically all the fuel they use. The deposits of other parts of the world have been much less thoroughly explored ; as yet their actual production is very small in the aggregate. So far as is now known no other continent

compares with North America in coal resources. China, India, South Africa, and Australia are the only important countries outside Europe and North America which are known to possess fairly abundant deposits of this basic source of power.

Petroleum and Gas

Just at this time petroleum is playing a leading part in the economic life of the United States. Along with its volatile offspring, natural gas, it is furnishing more than one third as much heat and power as coal itself. Unparalleled among liquids for lighting and as a lubricant, petroleum nevertheless finds its chief significance today in its high concentration of energy. This makes it the unequaled fuel for the ocean liner and the battleship. This same quality, together with volatility, makes gasoline the prime factor in the immense expansion of the use of internal-combustion engines.

Since 1857 (before that year no petroleum was produced in this country and almost none anywhere else) the rocks of the country have poured forth nearly twice as much oil as all the rest of the world put together. Most of Europe is very poor in petroleum. The only rich deposits are in Russia, and the only other countries with appreciable supplies are Rumania and Poland. The most important reserves now known outside the United States and Russia are those of Mexico, Colombia, Venezuela, Persia, Mesopotamia, and the Netherland East Indies. It is impossible to forecast future discoveries of this mysterious and deep-hidden treasure, and there can be no assurance that any one of these countries or others will ever prove as rich in oil as was the United States, though it may ultimately prove that the world's largest storehouse of oil is the region between the Caspian and Black seas and the Persian Gulf. It is noteworthy that outside of the United States the possession of deposits of petroleum has not been the means of building up manufacturing industries. The output of the other pres-

ent oil-producing countries has been, and probably will continue to be, shipped chiefly to Europe and the United States.

Immensely important as is petroleum in the United States in our day, it is quite possible that the star is nearing its zenith, so fantastic has been the rate at which the accumulations of millions of years have been drawn from the earth. However, the outlook is more promising than it was considered by geologists ten or twenty years ago, when very early exhaustion was prophesied. How much more will ultimately be produced from American wells depends largely on the relative cost of imported oil and of substitutes derived from shales, from coal, or from plants.¹ America has very great deposits of oil shales, and it is probable that oils can be extracted from them at a cost roughly double that of present petroleum production.

Whatever may be the future, petroleum has for several decades been an immensely important factor in the progress and well-being of the United States. It has served as a cheap fuel in regions where coal was dear. It has made the automobile possible for many million families. It has given the farmer power in peculiarly convenient form. It has added to the carrying capacity of merchant ships. Kerosene, gasoline, natural gas, and manufactured gas enriched with petroleum have played a most useful part in the household: they have eased the labors of the kitchen and have given cheap and brilliant light. Some day the world may have to wave farewell to this marvelous product; but in the meantime it is a bounty-bringing guest.

Geographic Distribution of Power Resources

The geographic distribution of America's power resources is fortunate. Coal, oil, gas, and water supplement one another. In most regions, if one is lacking, the other is available. New sources of energy have opened step by step with the westward movement of population. The first settlers

¹ See Chapter IX, Section 5.

along the Atlantic found abundance of household fuel in the native forests, and in many places waterfalls adequate for the limited needs of industry. Almost at the moment when the steam engine and the locomotive became practical agencies for applying power came the discovery of splendid coal deposits in Pennsylvania, close to the populous sections of the Union. As agriculture and industry pushed westward the central states disclosed other coal measures. The southern prairie region beyond, though possessing some coal, lacked adequate resources for heat and power till, about thirty years ago, the great mid-continent oil field began to pour forth its treasure. When the mines and smelters of the Mountain states called for power and heat, coal was forthcoming in a number of places, oil in others, and only the magic hand of capital was needed to unlock great stores of water energy. The swiftly growing population and industries of the Pacific coast found at hand water falling tirelessly from lofty ranges, and an abundance of petroleum. When the agricultural South began to want factories much coal was brought to light there, and water power was easily developed in many areas.

The present distribution of the production of coal and of the water-power installations is far from reflecting the ultimate potentialities of the several regions of the country. When growth of population and industry creates the demand, a great deal more coal can be produced in several of the Middle Western and Mountain states, and in the latter far more water power can be put to work. Nevertheless even the statistics of present production of mineral fuels and water energy furnish evidence of the wide distribution of power resources. A large number of states already enjoy the benefit of a very considerable output of these primary sources of heat and power. Some twenty-one have each a combined production of mineral fuels and water energy equal to more than five million tons of coal per year. Outstanding are Pennsylvania, West Virginia, Illinois, California, Oklahoma, Kentucky, Texas, Ohio, Indiana, Arkansas, each with the equivalent of more than twenty million tons. Coal is the

principal item making up the total in six of these ten states ; but in California, Oklahoma, Texas, and Arkansas the major factor is petroleum, and in California water power is also of great importance.

More significant even than the distribution among individual states is the fact that with the exception of New England each of the great geographic divisions of the country has within its borders large sources of heat and power. In seven of the nine divisions the output of mineral fuels and water energy exceeds the equivalent of 40,000,000 tons of coal ; in the West North Central division it is about 25,000,000 tons. Moreover, certain of those areas which lack local supplies are able to take advantage of water routes to bring coal in cheaply. This is notably true of New England, of Minnesota, and of the Dakotas.

SECTION 6. OTHER MINERAL RESOURCES

The generation of mechanical power would serve man but little were there no machines through which to apply energy. Industry today makes use of machinery to an extent undreamed of even a few decades ago. It is here that the metals become indispensable. Almost every machine consists chiefly of metal, many exclusively of that material. Only metals possess the needed strength, ductility, hardness, and durability. The same qualities which make the metals irreplaceable in machines give them also great utility for construction. Without steel rails land transportation would be greatly limited ; without steel beams and sheets the huge modern steamship would be impossible. The skyscraper, economizer of space in crowded cities, is framed of this same doughty metal. Transmission of electrical energy requires metallic conductors. Scores of other important uses for metals are familiar.

Apart from aluminum the principal metals have been in use by mankind for many centuries, but the consumption in early times was infinitesimal as compared with today's.

Those uses which now demand the great bulk of the iron and copper and zinc and lead and tin were then entirely unknown. Moreover, in very recent times marked improvements in metallurgy have been made. New methods of treatment and of alloying have adapted iron and other metals to requirements of ever widening variety.

The United States, with its high development of industry and transportation, is the world's greatest user of metals; its consumption of most of them approaches or exceeds that of all other countries combined. This would scarcely be possible were the country not possessed of rich ore deposits. In point of fact it ranks first by far among the countries of the world in its present production, and, so far as is known, in its reserves for the future, of the most necessary of all metals — iron, copper, zinc, and lead. It has also large supplies of bauxite, the ore from which aluminum is produced, although at present much of this ore is imported. The only metal which compares in importance with the five just named is tin, for which the United States, in common with most other countries, is dependent on a few remote sources. There are, to be sure, a number of other metals of growing significance in modern industry of which the country possesses little or none. These are mainly useful as alloys of iron. They include manganese, nickel, vanadium, chrome, tungsten, and the like. As yet the known deposits of these throughout the world are few. They are found chiefly in countries little developed industrially. The principal nations of Europe, like the United States, are dependent on imports.

Iron

Iron far transcends all other metals in utility. In various compounds it is extremely abundant, making up perhaps 5 per cent of all the earth's outer rock layers. The proportion of iron in various rocks and ores, however, varies from a mere trace to as high as 70 per cent. The expenses of transportation and reduction, which are usually more impor-

tant factors in the cost of the metal than that of extracting the ore, vary with the percentage of iron in the material; consequently only deposits relatively rich in iron have commercial value at present. The position of the several countries as sources of iron depends on the richness of the ores they possess, the thickness of the deposits, the depth at which these lie, and their geographic location. In all these respects the United States has a conspicuous advantage over most parts of the world.

Deposits of workable iron ore are constantly being discovered in various countries, especially in more backward and remote regions. In 1905 a Swedish expert estimated the world's total deposits of commercially valuable ore at ten billion tons.¹ In 1926 an American expert declared that, even of ore considered workable at approximately present prices of iron, the known supply was nearly sixty billion tons; besides these "actual" reserves, he lists known deposits of lower grade or less accessible ores believed to contain something like three times that quantity.² A large number of countries are credited with considerable "actual" reserves, and in the case of some countries the fact that they are credited with but small quantities or none at all is doubtless due in part to the limitations of our present knowledge.

Although iron ore is thus widely distributed, the deposits of the United States surpass in magnitude and ease of extraction those of any other producing country, though those of Brazil, as yet scarcely touched, may prove superior. Of the estimated total of fifty-eight billion tons of "actual" reserves in the world, the United States is assigned over ten billion. Among the European countries France, since its recovery of Alsace-Lorraine, has the richest deposits; estimated at about eight billion tons, followed by Great Britain with six billion. But the American commercial ore contains on the average a much higher proportion of iron than that of these two countries. Germany has only about

¹ See *Encyclopædia Britannica*, Eleventh Edition, under "Iron."

² Olin R. Kuhn, in *Engineering and Mining Journal*, July 17, 1926.

one eighth as much ore of commercial grade as the United States. Sweden, Norway, Russia, and Spain are relatively rich in iron. Outside of Europe the most important deposits known are those of Cuba, Brazil, Chile, Newfoundland, South Africa, India, China, Australia, the Philippines, and the Netherland East Indies. The iron resources in many countries play little part in the national economy because industry is so little developed or because fuels for smelting are lacking.

The iron ores at present utilized in the United States are very cheaply mined. In Minnesota, by far the largest producing state, they lie near the surface and in huge masses; a large proportion can be extracted from open cuts with the steam shovel. Although the richest deposits — those of the Lake Superior region — are far removed from the centers of coal production and iron consumption, the Great Lakes afford a cheap highway for bringing the ore to those centers. What with America's richness in coal, it obtains iron at very low cost. Nevertheless its advantage over the industrial countries of Europe in respect to iron lies less in present cheapness than in the possession of reserves that will permit low-cost production to continue for a longer time. At the present rate of extraction the American reserves of ore of the first quality will last less than half a century; but the reserves considered as utilizable at fairly reasonable cost will last several times as long, and those of still lower grade, which can ultimately be used without prohibitive expense, may readily supply the country's needs for a thousand years or more. As the mass of iron already installed in structures and machines piles up it becomes possible to care for an increasing proportion of new demands by resmelting old material.

Copper

Copper easily ranks second among the metals in industrial importance. It has a multitude of uses, either in its pure form or alloyed with zinc to make brass or with tin to make bronze. It and its alloys are capable of brilliant polish. Pure

copper is exceptionally malleable and ductile. Brass may be made to vary in physical characteristics through a considerable range. Most important is copper's extraordinary conductivity of electricity. As a result of this property the demand for this metal has advanced by leaps and bounds.

Copper ores are of such variety, they differ so widely in metallic content, and the deposits present such diversities as to accessibility and cost of mining that it is impossible to arrive at any significant comparison of ultimate copper reserves. The data of actual production, however, enable us to compare the several countries with respect to the availability of the copper deposits at the present time and for the near future. For many years the United States has produced half or more of the world's total output. It is specially favored in this respect as compared with other leading industrial nations. Of these Japan and Germany alone produce copper in appreciable quantities, and Germany has to import the greater part of its supply. The copper output of all Europe is not one tenth the American production. Apart from the United States the leading copper producers at present are mostly countries little developed in manufacturing industry (for example, Cuba, Mexico, Chile, Peru, and the Belgian Congo), and almost none of their copper is used locally, practically all of it being exported; in fact, a great proportion of the output of the Western Hemisphere is shipped to the United States in crude form for final treatment.

Nonmetallic Minerals

Apart from its endowment of mineral fuels and the metals, the United States has an abundance of many other useful minerals. Building stone, widely distributed, including high-grade marbles, granites, sandstones, and limestones for the finer forms of construction; clays for bricks, tile, terra cotta, and pottery; phosphate rock; abrasives; sulphur, — all these and others of less importance are found

in adequate quantities. The nonmetallic minerals which the country imports, like most of the metallic minerals, are of secondary rank.

Taking it all together, the mineral resources of the United States far surpass those now known to exist in any other country (certain countries, like Siberia and Brazil, to be sure, have as yet been little explored). This leadership is partly the result of its huge area; but even square mile for square mile there are very few countries of greater underground wealth.

SECTION 7. RESOURCES IN RELATION TO NATIONAL SELF-SUFFICIENCY

Thus in all the major classes of natural resources the United States is remarkably endowed. Even in proportion to area it compares favorably with almost any other country and surpasses most of them. In view of the relative sparseness with which it is peopled the volume of the natural forces and materials at the disposal of the average individual is almost without parallel. Moreover, the variety is such as to supply practically all the downright necessities of life and most of those things essential even to an advanced civilization.

Above all, the country has abundance of land. This spells sufficiency, and surplus for export, of the basic foods and of cotton, most indispensable of all textile materials. It enables the people to enjoy a varied and attractive diet, rich in meats and dairy products. It makes it possible for a fraction of the population to raise enough to support vast numbers who can devote themselves to producing those elaborated goods and performing those services which characterize a high standard of living. Moreover, there is in the United States such leeway for further agricultural expansion and for the adjustment of consumption that, with any reasonable or probable increase in population, it has the promise of retaining this fortunate position.

The forests of the United States, too, are exceptionally abundant. They supply cheap woods for construction and other uses. The easy supply of wood during the period of early development economized labor immensely. The forest area will no doubt be somewhat further reduced in the future to make room for agriculture and grazing. Proper planting and care of trees, however, and conservation in cutting and in the use of products will enable the country to maintain indefinitely a fairly liberal consumption of wood — especially in view of the increasing substitution, characteristic of an older community, of more durable building materials.

Mechanical power, that multiplier of man's strength, is afforded by the country's natural resources at exceptionally low cost. The power of falling water, by its nature unwasting, is far from adequate to meet total requirements; but American water-power resources compare favorably with those of most countries, and their geographical distribution is such as to make up the deficiency of coal in important regions. Of coal, the major source of power, the United States has known deposits more abundant and more easily worked than any other country of the world. Petroleum, the most concentrated and most convenient of the natural fuels, is present in scarcely rivaled measure, though the immensely rapid depletion will ultimately make oil much more expensive. The United States, too, has the largest and best deposits known to exist anywhere of the four most important industrial metals — iron, copper, zinc, and lead. Its supplies of these, with the exception of lead, will last for centuries, although ultimately costs of extraction and smelting of ores are bound to rise. Apart from the mineral fuels and the metals, the country affords an abundance of many other valuable minerals.

This richness and variety of resources in the United States render it self-sufficing to a very high degree. Not more than 8 or 9 per cent even of the transportable goods which the American people consume are brought from foreign lands. Of the total fund of all goods and services which

they enjoy, the proportion imported is smaller still. The self-sufficiency of the United States is particularly great in respect to those commodities which are the most indispensable to existence and to national security. It is not dependent on the outside world for any essential foodstuff. Those that are imported rank as luxuries or as semi-luxuries. The land suffices, too, for much the greater part of the national requirements of the necessary materials for clothing and footwear. It furnishes all essential forest products; and it is only because the maw of the printing presses is so ravenous — an appetite which could of course be checked under pinch of need — that paper is imported from foreign sources.

The United States is lacking in none of the most necessary minerals. Those which it imports from abroad are less essential to industry, to the well-being of the people, and to the needs of national defense.

In contrast with this high degree of self-sufficiency, most of the European nations are in a large measure dependent on the outside world for basic necessities. All lack cotton, almost all lack petroleum, several have inadequate food supplies, and several must depend on other countries for coal. Though Europe as a whole has resources perhaps as rich and as varied as the United States, it is cut by many national boundaries, and each country in its limited area is short of several or many of the fundamentals of economic life; moreover, the continent as a whole is so densely populated that its land is insufficient to supply the foodstuffs and other agricultural products required.

National self-sufficiency of resources is an asset which only the country that lacks it can fully appreciate. It makes possible a varied industry; it gives opportunity for the application of all kinds of physical and intellectual capacity and for the interest in business that comes through diversity. It cheapens the cost of goods, cutting down the distances to which they must be carried and the amount of the middleman's profits. By reducing needs for imports it lessens the

necessity of exportation and thus minimizes the effort required to find markets for the products of the nation's industries.

Self-sufficiency, above all, affords protection. The country which possesses it in large measure need fear little from restrictive policies of foreign governments or of foreign monopolies as to production, exportation, or importation of commodities. Such policies can threaten neither deprivation of needed supplies nor extortionate prices. In particular the risks of war's interference with economic life are greatly lessened. The country of varied and abundant resources cannot be starved by any conflict between foreign nations or between it and any foreign enemy. Its own sinews of war cannot be hamstrung by the blockading of channels of trade. Self-sufficiency is a major weapon of national defense.

The preservation of its high standard of living and of its exceptional self-sufficiency should be a cardinal point in the national economic policy of the United States. This end demands that the people shall not by overcrowding their numbers put undue pressure on their resources; hence the wisdom of setting limits upon immigration. It also demands that those resources which are by their nature exhaustible shall not be wasted. Reasonable conservation is a duty, especially to future generations.

CHAPTER V

SECONDARY FACTORS IN AMERICAN PROGRESS

SECTION 1. THE SPREAD OF EDUCATION AND RESEARCH

It has been pointed out that the factors which serve to explain the efficiency and progress of American industry and commerce fall into two groups: (1) primary factors and (2) secondary factors largely resulting from the existence of the former. The basic factors — the character of the population, the richness of natural resources, and the absence of overpressure of population on resources — have been considered. The present chapter takes up a number (by no means all) of the important secondary, or proximate, causes that go to make American economic life what it is.

Perhaps the most important of these is the wide diffusion of education. In no other country are instruction, both elementary and advanced, and scientific research so liberally provided. This fact is due mainly to the quality of the population itself and to the rich natural resources at its disposal. These have created desire for education, capacity to receive it, and ability to pay for it. An important influence for education is the spirit of democracy. The freedom from caste, the political equality of all citizens, have carried with them the concept of universal education. Little as government, from the outset of American history, was expected to interfere with individual initiative, it was expected to give the individual a start. Even when settlements were new and poor the little red schoolhouse was one of their first structures. With growing wealth the people could more and more afford education for their sons and daughters. Not merely were they able to spend liberally for instruction; even more important, they could afford, as in few other

countries, to let their children give time to schooling instead of devoting it to the family support.

Americans are fast becoming the most highly educated people of the world, if they are not already so. This statement may be challenged and, unless it is qualified, perhaps justly challenged. Opinions as to educational standards depend upon the point of view. Certain individuals and certain social classes in this or that foreign country may perhaps fairly lay claim to higher culture in literature, art, and philosophy than is found here; but when the mass rather than the pinnacle is viewed, any comparison must be very favorable to the United States. The proportion of the total number of people of all ages who have received elementary education is higher than in most other countries. The proportion who have received intermediate education and the proportion who have had the benefit of college or university training are almost if not quite without parallel. The proportion of the youth who are at the present time acquiring intermediate and advanced education is much larger still and is rapidly advancing. It far exceeds that in most other countries, and materially surpasses that even in such countries as Switzerland, Canada, and Australia. All these educational ratios in the United States read much more favorably when related to the native white population alone than when related to the total population. The heavy immigration of recent decades has brought to America many persons with little or no schooling; nearly a fourth of the newcomers in the fifteen years preceding the World War were illiterate. Moreover, until recently much less was done for the instruction of the colored people than for that of the white people.

It is not possible to make close statistical comparisons between countries with regard to standards of education. The United States, like most other countries, possesses no statistics of the number of persons who have enjoyed a given amount of instruction, measured either by the time given or by the grades attained. Some significance attaches to international comparisons with respect to illiteracy. Of course

a person may have learned to read and write but have had little more instruction. However, if in any country there are many illiterates it goes without saying that there are many others whose schooling has been extremely rudimentary.

Data of illiteracy in the United States mean little without distinguishing classes of the population and sections of the country. In most of the states at least a certain amount of school attendance has for many years been compulsory for all children. Among the native population of such states there is practically no illiteracy, but among the foreign-born the proportion not infrequently is fairly high. Educational facilities in the Southern states, especially for Negroes, have been much improved in recent decades, but the lack in earlier periods is reflected in rather high illiteracy ratios among the older persons in the white population and in very high ratios among the older Negroes. In 1920, among the native white population of the United States as a whole only 2 per cent were reported by the census as illiterate, and outside the South the number in most states was less than 1 per cent. That the figure for the total population rises to 6 per cent is due to the much higher ratios in the other elements of the population.¹

Even the very low proportion of illiteracy among the native population of the North and West is little more favorable, if at all, than appears in several of the advanced nations of western Europe or in Canada, Australia, and New Zealand. In all these, as in America, elementary education is widespread, usually compulsory. There are many countries, however, where schooling is much less common, as may be judged from the number of illiterates among the immigrants coming to the United States in the period just before the war, before the literacy test was made a condition

¹ The census figures of illiteracy here used may be too low, by reason of carelessness or misrepresentation in the returns. It should be noted, moreover, that a person able to read and write in any language, not necessarily English, is counted as literate by the census. The examinations in connection with service in the World War revealed a much higher proportion of men unable to meet the definition of literacy which was applied.

of admission. Immigrants of several of the races from southern and eastern Europe at that time showed illiteracy ratios from 15 per cent to as high as 60 per cent.

The recent history of the United States has witnessed great improvement and extension of educational facilities. Even in those states where public common schools have existed almost from the beginning they were formerly, in many cases, open for only a few months or even a few weeks of the year. Steadily the number of schools has increased and the duration of instruction has been lengthened. At the same time there has been rapid development of intermediate and advanced education.

In the forty years between 1880 and 1920 illiteracy among the native white population was cut from $8\frac{1}{2}$ per cent to 2 per cent; among the Negroes, from 70 to 23 per cent. In 1870, 57 per cent of the children from five to seventeen years of age were in elementary or secondary schools; at present the proportion is over 80 per cent. The average number of days of attendance per year has risen from 78 to 136. This means that the children are receiving much more than twice as much instruction, quantitatively speaking. Even since 1890 the increase in this respect has been about 90 per cent (see Fig. 21, *C*). The fact that more than four fifths of all the children are enrolled at one time gives evidence that the great majority are getting the benefit of ten or more years of schooling. Only a small proportion fail at least to finish the "grades," with their prevailing eight years of training.

Even more noteworthy are the facts as to instruction of more advanced grade (see Fig. 21). In the short period between 1890 and 1926 the number of pupils in high schools and academies multiplied eleven times. While formerly they constituted 6 per cent of the total number of high-school age, they now are more than 38 per cent.¹ In many of the

¹ Since the ordinary period of high-school attendance is four years, comparison of the number of pupils is made with the total number of young persons in a four-year age period. Whether the basis is the number from 14 to 17, inclusive, or from 15 to 18 or from 16 to 19 scarcely affects the ratio.

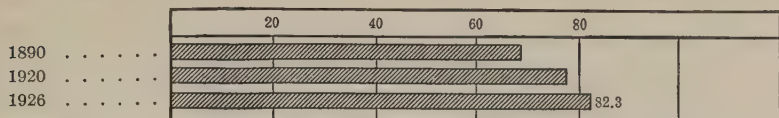
Northern and Western states half or more of the children are receiving a high-school education. The number of students in colleges, universities, and professional schools (excluding preparatory, summer, and extension courses) at present is over three quarters of a million (it was already 726,000 in 1926). Nine times as many are attending these higher institutions as in 1890. One out of about eleven of the young men and women is a college student.¹ The increase in the number of pupils in high schools and colleges since the World War has been remarkable.

Along with the great increase in the volume of instruction given has gone a decided improvement in its quality. The changes in educational methods in the course of a generation amount almost to a revolution. Emphasis has been shifted from storing away facts by rote to the training of reasoning power. Thousands of able men and women have devoted profound study to the problems of educational method. At the same time ever increasing liberality in public expenditures and in private contributions has provided better buildings, better equipment, and better-paid and more competent instructors. There is much room for further improvement. Unquestionably, however, the United States has made more progress in educational methods in the last half-century than any other important country. Nowhere else is the educational system, taken in its entirety, better adapted to prepare the masses of the people for a decent, efficient, and happy life.

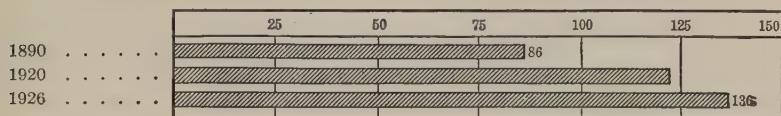
Education on such a scale and of such a grade is costly. Scarcely any other country can afford to spend so liberally. The total outgo of the schools, colleges, and universities of the United States is about \$2,500,000,000 annually, over \$20 per capita of the entire population. Expenditure for elementary and secondary instruction is equal to about \$70 per year for each child between five and seventeen years of age in the country; in 1890 it was less than \$8. Even taking

¹ The exact ratio will depend on whether comparison is made with the total number in a four-year age period or in a five-year age period.

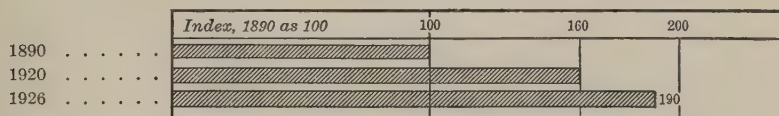
A. PERCENTAGES OF CHILDREN OF AGE 7 TO 17 YEARS IN PUBLIC SCHOOLS



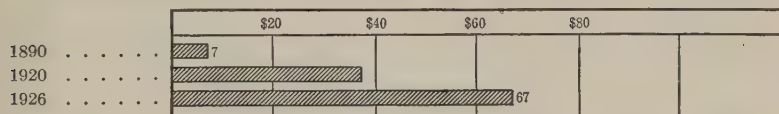
B. AVERAGE DAYS PER YEAR OF SCHOOL ATTENDANCE PER PUPIL



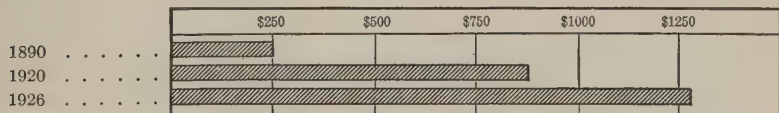
C. VOLUME OF INSTRUCTION IN SCHOOLS PER CHILD ($A \times B$)



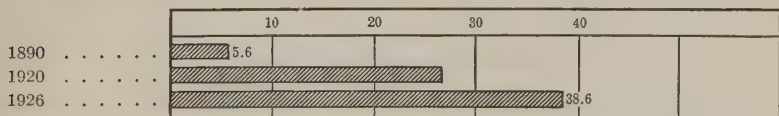
D. EXPENDITURES FOR EDUCATION PER PERSON OF AGE 7 TO 17 YEARS



E. AVERAGE ANNUAL SALARIES OF SCHOOL TEACHERS



F. PERCENTAGES OF CHILDREN OF AGE 14 TO 17 YEARS IN HIGH SCHOOLS



G. PERCENTAGES OF YOUTH OF AGE 18 TO 21 YEARS IN COLLEGES ETC.

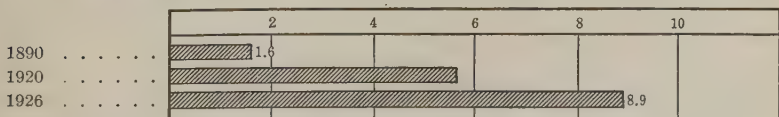


FIG. 21. Diagram showing the growth of educational instruction

C is derived by multiplying the days of attendance by the percentage which pupils form of all children. Present figures for *F* and *G* are decidedly higher than in 1926

into account the lower buying power of money, the country is spending five or six times more for the education of each child than it spent a generation ago. The better quality of instruction is reflected in the advance in the annual average salary of the school-teacher, from about \$250 to about \$1300. The colleges and professional schools spend annually between \$500 and \$600 per pupil. In the short period between 1910 and 1926 their aggregate expenditure quintupled.

How Education contributes to Economic Efficiency

From the standpoint of industrial progress the utility of all this educational effort is scarcely less obvious than its social and political advantages and its contribution to the enjoyment of life. It makes for efficiency in every occupation, from the digging of a ditch to the engineering of a mighty tunnel, from operating a spindle to inventing a new machine, from selling groceries to the management of a great corporation.

The time is past when in any country advanced in technique a sharp line can be drawn between work of the hands and work of the brain. Almost everywhere the mind makes an important contribution to output. The modern farmer or mechanic or factory operative must be able to think. We have learned also that even from the point of view of economic efficiency alone industrial education in the narrow sense — training for some particular craft or occupation — is not enough: general education counts even more. A few decades ago there was much agitation in the country for making the public schools more "practical." It was urged that cultural studies merely made the workingman discontented with his lot and tempted him to push into the already overcrowded ranks of the "white-collar men." Manual training, vocational education, direct preparation for the job, were proclaimed as the means of salvation for the "common people." Today the workingman demands for his son or daughter a liberal education, not merely because it makes

life better worth living, not merely because it gives more chance to rise in the social scale, but because it makes a better worker. For those who are able to foresee for themselves some special field of work, more specialized industrial and commercial instruction may well be added; but, first and foremost, there must be the general culture of the mind, the training of the reasoning power, and the widening of the outlook.

The use of more and more complex methods and machinery is characteristic of industrial progress. The successful farmer of today does not merely plant a few standard crops according to traditional methods: he must adapt his crops to the peculiarities of soil and climate and to the changes in demand; he must be an expert in seed selection, crop rotation, the use of fertilizers, the rationing and breeding of animals, the preparation of his products for an exacting market; he must have a mind trained in the broad sense if he is to be capable. It is the same with the factory worker. He is using expensive and elaborate machinery. This may be highly automatic: it may require little physical toil, but if he does not keep it working at full capacity there is heavy waste. If he lets it go wrong, machine or material may suffer costly damage. His mind must be alert, his judgment keen. So too, with the rapid progress of industrial methods, the operative may be called upon every now and then to tackle a new machine or a new process. The dull wit cannot keep the pace. And thus it is in all branches of production and distribution.

Education promotes national efficiency in other ways not less important. It uncovers capacities that would otherwise be lost to the common service. Inborn mental strength is no monopoly of the sons and daughters of the rich and the cultured; but without opportunity for education the flower too often blushes unseen. Its very existence may be unsuspected or its growth be stunted. In the United States tens of thousands of inventors, technical experts, and managers of big enterprises have risen from the ranks because the schools gave them a fair start.

The important effect of education upon the attitude of the workingman toward his job is discussed in a subsequent section.

It is needless to dwell long upon the immensely important part which advanced education and scientific research play in the economic life of the United States. Much that has just been said regarding the working of elementary and secondary education applies here also. The one greatest service of the colleges and universities, from the economic point of view, as from any other, is that they train men and women to think ; but they contribute also in more specific ways.

The higher institutions of learning are devoting more and more attention to research in pure and applied science. With the possible exception of Germany, there is no other country in which so much relative stress is laid upon research as compared with instruction. With unparalleled numbers of professors and students and with unequaled equipment, American colleges and universities are today leading the world in their contributions to scientific knowledge. Whether the aim of the investigator be frankly practical or the opposite, whether he seeks directly some new method or process of production or aspires to discover some basic law of nature, the outcome may be a long stride in industrial progress. Physics and chemistry and biology and geology and mathematics bring to light new forces, new commodities, new ways of winning wealth. That economic giant, electricity, owes its stature largely to the research laboratory.

Again, the higher institutions are turning out great and increasing numbers expressly trained for the advanced tasks of modern economic life. There are schools of engineering, of industrial chemistry, of commerce and business management. Their courses are many and varied ; close specialization is possible for him who desires it. With the constantly increasing complexity of industry and commerce business men have ceased to look askance at the college man. They no longer urge that all one needs to know can be learned on the job itself ; on the contrary, they are insisting on greater

public expenditures for advanced instruction and research, and are themselves making bigger contributions for that purpose.

Education works cumulatively. Natural resources tend toward exhaustion: minerals once extracted do not grow again; even the soil may be worn out. But a forward step in industry that represents an achievement of the mind need not be retraced; rather it makes the next step easier. Each door unlocked by science leads to other doors. This is much more the case today than in ancient or medieval times. For modern research is more fundamental: it proceeds according to reasoned methods; it is systematic. Moreover, its results are effectively recorded. The press, the photograph, and the museum preserve and disseminate every attainment. Each new investigator may profit by all that has gone before.

Not merely do advanced education and research thus tend forward: the general propagation of knowledge and thinking power among the people also cumulates its effects. Good teachers train better teachers. Educated parents rear healthier children; they train them better in the home; they aspire to give them even a better education than they themselves enjoyed. And, finally, the greater national income which education brings permits still larger expenditure for the instruction of the next generation.

SECTION 2. THE POSITION AND ATTITUDE OF LABOR

As we have seen, labor in the United States enjoys an exceptionally high measure of well-being. This fact is at the same time the result of the general economic efficiency of the country and a major cause contributing to its efficiency and progress. A prosperous working class goes far to make a prosperous nation.

The basic factor in the workingman's lot is, of course, his wage. Throughout American history the worker has been relatively well paid as compared with his fellow elsewhere.

But the improvement in his wages during recent years has been so great as almost to justify the phrase "a new era." The benefit which has come to industry from these recent high wage-levels is universally recognized. For the first time perhaps anywhere in the world American employers, almost to a man, have come to preach the gospel of the high wage. Delegations of European business men who have visited the country since the war have reported their conviction that American prosperity is largely due to this cause. In the sense that the World War, by its incidental effect on commodity prices and cost of living, hastened the advance in real wages, and in that sense only, the United States may even be said to have profited from the great conflict (see Chapter II, Section 6).

The advance in wages that followed the war helped business in three ways. In the first place, it put heavy pressure on the managers of industry to economize labor. If the wage bill could not be cut down by lowering wages, the fall in prices must be met by reducing the amount of labor applied per unit of output. Machines must be substituted for men; work must be organized more scientifically. Improvements that would have been postponed with cheaper labor were promptly introduced with labor so much dearer. In the second place, the high level of wages created a wholly unprecedented buying power among the masses. The demand for goods swept upward. Wage-earners who could not before have afforded them began to buy great numbers of automobiles and other modern conveniences of many kinds. Hundreds of thousands moved into better homes; building became extraordinarily active, bringing heavy demand for materials. Owing, in large measure, to increased working-class consumption, industrial plants could operate with high capacity. This meant lower unit costs, thus again tending to offset the higher wages paid. Lastly, the advance in wages has improved the attitude of the worker toward his job. He has been more contented than ever before, willing to work harder, more disposed to coöperate with the

employer to prevent waste. During recent years industry has been exceptionally free from labor disputes, with their stoppage of production and their aftermath of bitterness and friction.

Although these favoring influences have been particularly conspicuous during the past few years, they have all along been an important factor in American progress. The effect has been cumulative. Year by year industry has pushed forward by the momentum of past advances in wages and of improvement in the condition of the masses of the people.

Education has contributed in an important way not only in making workers more intelligent in their work but also in bettering their attitude toward it. On the one hand, education breeds "divine discontent," the desire to get ahead in the world, the confidence that getting ahead is possible. The sodden peasant, the half-starved, illiterate toiler, can scarcely conceive of anything better; he sees little to gain by putting forth greater effort, care, and thought. On the other hand, education brings satisfaction in the present. The well-educated mechanic sees the broader bearings of his task; he takes pride in it. Then, too, when the day is over the worker with a decent education finds interest and enjoyment in his leisure. This is the more true if he has a liberal wage and can afford a fair measure of the satisfactions which the mind demands. By making the life of all more worth while, the schools are a powerful means of preventing friction between the classes and of stirring the whole population to coöperative effort for individual and common gain.

It is partly because their thinking powers are better developed that the wage-earners of the United States are less imbued with false economic notions than are those of most countries. They are remarkably free from "isms." Communistic doctrine is officially and firmly rejected by their leading organizations; on very few individual workers has it made any impression.

In Europe, notably in England, the fallacy is widespread that the less the worker produces, the better for him and

his fellows; that there is not enough work to go round. By the "ca' canny" practice — as the British worker calls the deliberate restriction of output — employment is to be stretched over a longer time and over more persons. This is not so much the fruit of laziness as of conviction, half thought through. Opposition to the introduction of labor-saving machinery and methods springs from the same error in thinking. In the United States the workers recognize (sometimes rather dimly perhaps) that what makes wages high, even what makes jobs plentiful, is large output. They see that only out of what we produce can we consume; that the wage-earner bites off his own nose when he does less than his best. More important in explaining this attitude than any mere scholastic instruction in economics or than even the general cultivation of the powers of thinking, however, is the practical experience of the American workingman. He has seen wages advance as industry became more efficient. He has noted that often the factory which puts in some labor-saving device is able to sell enough more goods to keep its working force unchanged or even to increase it. He has seen that where some industry actually drops men out they usually soon get jobs in another; though not infrequently, of course, the shift involves more or less hardship (see page 91).

It should be borne in mind that the difference in general economic conditions between America and Europe has much to do with the difference in the attitude of the workers. If the European wage-earner loses a job it is harder to find another. When at the recent International Economic Conference at Geneva the "rationalization" of industry was under discussion, not merely representatives of labor but thoughtful economists as well expressed grave fears as to the effect on employment. They urged that in Germany, for example, the recent introduction of labor-saving devices and other improved methods of production had thrown great numbers out of work. In America, with many resources yet not fully developed and with new industries constantly

springing up to meet the advancing standards of living, the shift of labor from one field to another is much easier.

There has been much discussion as to the effect of the "mechanization of industry" upon the worker. Some hold that it is deadening to the mind if not stunting to the body. These fears, to be sure, are less commonly voiced than in the early days of the Industrial Revolution in England, when hours of labor were often shockingly long and factories highly insanitary. It is still urged, however, that work with machines is excessively monotonous, if no worse; that it tends to destroy initiative and imagination and to take away all interest and love for the task.

Even if it were true that modern factory work is altogether dull and uninspiring, the worker would scarcely hanker for the days of yore. Machine methods are so vastly more efficient than hand methods that the product available for distribution is far greater. Wages — real wages — are consequently very much higher and hours of labor shorter than before the days of steam and electricity. The worker can afford to put up with eight hours of drab routine if during the rest of his day he has a fair abundance of the good things of life.

But the picture of the modern workshop is by no means all gray: it has high lights and warm colors. Here you see a worker straining his muscles all day long, there one spending most of the time merely glancing at some intricate machine to see that it keeps running smoothly. One merely feeds piece after piece of material into a steel jaw; another guides an operation with careful precision and quick and difficult exercise of judgment. Some must work with great rapidity to keep up with a remorselessly moving belt; others can, nay must, be deliberate. The critic need only visit a few typical factories to be cured of generalizing, favorably or unfavorably, about the characteristics of factory labor. No doubt familiarity with the actual conduct of the old hand trades would also have shown the fallacy of generalization as to the nature of their work.

It is certain that, however work in modern factories may compare with craft-work, the factory work of today is both lighter (apart from the shortening of hours) and less monotonous than the factory work of a century ago or even a quarter of a century ago. There are exceptions, but, broadly speaking, the statement holds true. The tendency is more and more toward automatic machinery. The heavy task is more and more thrown on mechanical forces. Hand-feeding of material is constantly giving way to self-feeding devices. As machinery becomes more intricate increased responsibility for keeping it in order falls on at least a part of the staff, in some cases on all the workers. Even when the tender of the elaborate mechanism expects to call an expert to his aid in case anything serious goes wrong, he must nevertheless be on the alert. The spinning and weaving of textiles are typically monotonous tasks; but when the thread breaks, quick and deft action is necessary.

An important factor contributing to the contentment of the American wage-earner is the improvement of the physical surroundings in which he works. Modern factories are far superior to those of the early days. They are better-looking, cleaner, more sanitary, safer, and better heated and lighted. The advance has been due to legislation and government inspection, to the influence of public opinion, to the pressure of the workers themselves and of their organizations, and, above all, to the changed attitude of the employers. Humanitarian feeling, pride, and self-interest have all conspired to make the factory manager more considerate of the comfort and safety of the force. He has learned that better surroundings mean more and better work. Many a factory of recent construction falls little short of the ideal as a place to work in. Some of them, for example, have baths that the average country club may envy. Many have facilities for games and sports, for reading and entertainment. Very much remains to be done before all American factories reach such high levels, but the advance is rapid.

It is not maintained, of course, that the American workman either is or ought to be entirely contented with his lot or that friction between labor and capital has disappeared. The United States still has strikes and lockouts and recriminations and even at times violence in labor disputes. But there can be no question that the attitude of the workers and of the employers alike has greatly improved during recent decades, and especially during recent years. Equally certain is it that labor problems are far less acute in the United States than in most other countries. Moreover, there is apparently good prospect both of further betterment in the position of the working classes and of further improvement in their relations with the employers. The faces of the leaders and of the great majority on both sides appear to be set in the right direction.

SECTION 3. CAPITAL IN AMERICAN INDUSTRY

American industry makes exceptionally large use of capital. In no other country are the hand and brain of man so aided by equipment accumulated by his past labor and saving.

The term "capital" has numerous definitions, depending on the connection in which it is employed. It is sometimes used as comprehending all forms of wealth. Others apply the term to man-made wealth, excluding the original gifts of nature, such as bare-land and mineral resources. As a matter of fact, it is often impossible to segregate the value of such natural resources from that of man-made capital. For example, a great part of the value of farm land represents improvements made by human effort, so incorporated in the soil that their worth cannot be separately determined. Capital is sometimes distinguished as comprising two forms — production capital and consumption capital. The first aids in producing something that can be sold to others. A factory machine is a typical example. Consumption capital is that which is used by the owner for his direct satisfaction; it is like any other consumable commodity except that it is

more enduring. The private automobile or the piano or the dwelling house is capital of this sort. The savings which the workingman puts into his home add as truly to social income as those his employer invests in his factory.

Man-created capital, broadly interpreted, makes up the great bulk of the wealth of the United States, the "pure" value of natural resources being a far smaller item. The total wealth of the country in 1922 was estimated at \$321,000,000,000. With the very rapid accumulation since that time it must now be at least \$350,000,000,000, not far from \$3000 per capita, or from \$13,000 per family. Estimates of national wealth are beset with difficulties, and few countries possess estimates even as trustworthy as that of the United States. The available data indicate that the average wealth per capita is from two to ten times as great here as in the countries of Europe.

It is impossible to state what part of the capital of the United States is used in production as distinguished from that which gives consumption satisfactions. The former is much the larger fraction, although the value of homes, furniture, motor cars, and other personal belongings runs into some scores of billions. One significant indicator of the vast volume of production capital is furnished by the statistics of corporations reporting for income taxation. In several of the major fields of enterprise the great bulk of the business is done by corporations. This is true in mining, manufactures, transportation, public-utility service, and finance. Agriculture is the only branch in which great amounts of capital are used with little participation of the corporation form of organization. One may hazard an estimate that three fifths of the "productive" wealth of the country (including land and other natural resources) is held by corporations; and in the case of production capital created by human effort, capital in the narrower sense above mentioned, the proportion may exceed three fourths.

The value of corporate capital in America is enormous. In 1926 corporations reported gross assets of nearly

\$168,000,000,000, equal to about \$1400 for every person in the population (see Fig. 22).¹

The most familiar forms of production capital are "fixed assets": plant, buildings, machinery, and other more or less permanent equipment. "Liquid," or "quick," assets, however, are just as truly a contributor to the national income, even though the liquid sometimes freezes. The stocks of materials, goods in process, and finished commodities in the hands of the manufacturer are essential to making and distributing his product. The stocks of the merchant are the very essence of his service. Credits are also tied up with orderly and efficient production and distribution. In the balance sheets of all business corporations, taken as a group, liquid assets amount to about three fourths as much as the fixed assets; for manufacturing corporations the two totals are nearly equal; and for trading corporations liquid assets are naturally much the larger.

That form of capital which most obviously and conspicuously serves to lengthen man's arm is the machine, especially the machine driven by mechanical power. Tens of billions of dollars' worth of machinery are used in the United States. The annual value of the new machines and parts manufactured each year (not counting motor cars) is over five billion; although a good deal of this goes to replace or repair old machines, the increment of the installation must be at least half that amount each year. As we shall see in Section 4, the power used to actuate machinery in America exceeds by many times the combined physical strength of all its human population.

¹ The total given for assets is exclusive of a large item designated as "miscellaneous," a great part of which represents duplication in the form of ownership of securities of one corporation by another, and in the form of loans by banks to corporations. This excluded item, however, also covers the value assigned to patents, goodwill, and trade-marks, often a very real asset in creating which much money has been expended. The omission of this value probably approximately counterbalances certain other duplications which remain in the total given; namely, that part of the bills and accounts receivable which represents liabilities of other reporting corporations.

Machinery is absolutely necessary to the harnessing of the inanimate power of nature. A man's muscles could work no harder if you were to burn coal under him or let the energy of a waterfall dash down on his head: we must use the steam engine or the water wheel. Moreover, the engine and the water wheel must apply their force through mechanisms. Since the power-generator cannot itself think, and since it lacks the marvelous adaptability of the human body, these mechanisms must often be extremely intricate: man must furnish to the engine a tool far more complex than that which he would use to apply his own strength to the same task. He must make a machine which all but has a mind. For the most part the machine does little that the hands of men, if there were enough of them, could not do. Its major function is to multiply force.

The United States, of course, has no monopoly of the invention, production, or use of machinery. Other industrial nations were earlier in the field, and they are today making great contributions of new devices and using great and growing quantities of machinery. For that matter, American makers sell machines invented by "Yankee ingenuity" to whoever will buy in any country. There can be no question, however, that more and better mechanical equipment is used to aid production in America than anywhere else. German experts estimate that the United States produces about 57 per cent of the world's total output of machinery. American factories, mines, railways, and farms are equipped with many machines not equaled elsewhere in size, power, speed, and degree of automatic action.

There is no way of calculating how much the use of machinery and other forms of capital adds to the output of industry as a whole, despite the fact that in many individual cases the addition brought about by a given application of capital may be accurately determined. From earliest history some capital has been employed. Ages ago man learned to wield simple tools and to put domestic animals to work. The introduction of mechanical power has added immensely to

productive capacity, but just how much no one can ever know. It is certain, however, that the quantity of goods turned out today by the factories of the United States or of any leading industrial nation is many times greater than would be possible with the use of the simple hand tools of a couple of centuries ago. It is estimated that the tender of modern spinning machinery turns out some forty thousand times as much yarn as the user of the old, hand-operated spinning wheel.¹

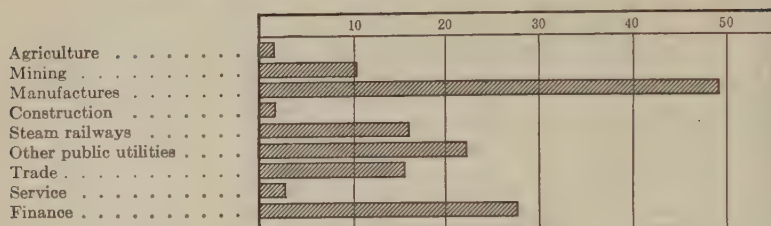
The question how much the use of capital increases production is very different from the question what share capital should receive or does receive out of the value of the joint output of capital, management, and labor. Fortunately labor aided by capital almost always gets more pay (often far more) than labor with no such aid could hope to earn. The actual return to capital as such — that is, interest as distinguished from reward to entrepreneurs for management and risk-taking, concerning which there are no general statistics — is in most industries much less than the amount paid to wage-earners and other employees. It is estimated very roughly that the amount of capital used in American factory industry is not far from \$58,000,000,000.² Calculating interest proper at 6 per cent, we have approximately \$3,500,000,000, as compared with \$14,000,000,000 paid out by the factories in wages and salaries.

The ratio between the value of productive capital employed and the number of wage-earners, as well as the ratio between capital and value of output, will vary greatly in different branches of industry. A larger use of capital in a given field does not necessarily imply greater efficiency than is attained in some other branch. By the very nature of the products and the processes the need for capital may vary

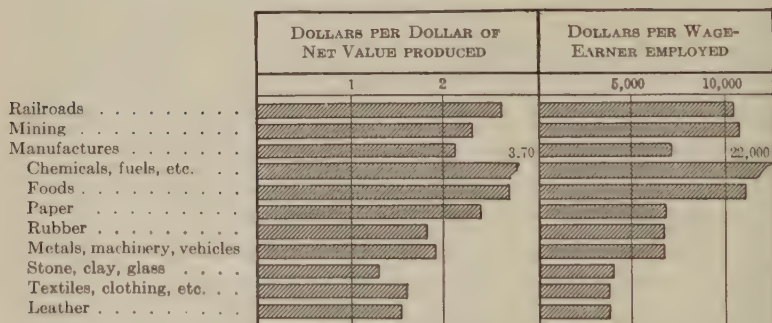
¹ This ratio would, of course, be somewhat reduced were account taken of the labor of others (such as miners who supply fuel for the machinery) who contribute to aid the spinner.

² Calculated from the reported value of assets of manufacturing corporations, \$52,000,000,000 in 1926, with allowance for unincorporated concerns.

A. ASSETS OF CORPORATIONS, IN BILLIONS OF DOLLARS, 1925



B. ASSETS OF CORPORATIONS



C. MAJOR FORMS OF SAVINGS

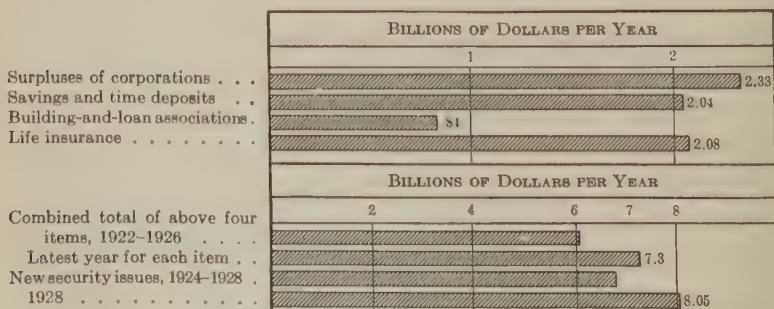


FIG. 22. Diagram showing capital in American industry

Section B shows, by way of illustration, that in factory industry the capital of corporations is equal to about \$2.15 for each dollar of value added to materials by manufacture annually, and about \$7000 for each wage-earner employed. Section C shows (for the latest available year in each case) the annual accumulation of certain major forms of savings. Much of the savings from these and other sources is used to purchase securities, the issue of which is shown at the bottom

widely. Here simple equipment suffices; there costly equipment may be essential to the cutting of labor costs. It should be borne in mind too that whereas in any individual industry increased application of capital will normally increase the quantity of output per worker, it will not always add to the money value of total output: it may so cut down the number of workers and the unit costs that even with a larger number of units turned out, the aggregate value is reduced.

It will be seen that in the three major branches shown in Fig. 22 the amount of capital used (according to rather rough approximations) ranges from about \$7000 to \$10,500 per wage-earner and is equal to from about \$2 to \$2.50 for each dollar of the annual net value of output.¹ The amount of capital per wage-earner is somewhat greater in mining and in rail transportation than in manufactures. In the case of mining this is at least partly due to the inclusion in the capital of the value of natural resources — minerals in the ground. The very high figure for the group of factories making chemical and related products is largely attributable to the petroleum-refining industry, in which there are relatively few workers but very costly equipment, and in which stocks of crude oil and products represent an immense investment.

Capital is employed more liberally in the United States than in any other country. This is indicated by the statistics of mechanical power (see Section 4) and by other scattered

¹ The figures for capital in the diagram are based on the statistics of gross assets of corporations reported for purposes of Federal taxation (as to the margin of error in these figures see footnote on page 195). For manufacturing industry as a whole an adjustment has been made to cover approximately the capital of noncorporate concerns; but since data as to the proportion of business done by corporations have not been published since 1919, a similar adjustment has not been made in the case of individual groups of factory industries. The ratios are therefore not altogether comparable, although approximately so. The whole diagram must be considered only a very rough indication of the relative importance of capital in different fields. The amount of capital per worker is computed on the basis of the wage-earners only, excluding receivers of salaries.

statistical data. It is confirmed by the consensus of opinion of all competent observers, both American and foreign. Industry by industry, with rare exceptions, the worker is aided by more and better machinery and other equipment here than even in the most advanced nations of western Europe. As compared with the poorer countries of the world the contrast is immense.

Several factors contribute to explain this difference. Since American industry is exceptionally profitable, producing goods at relatively low cost, it is in position to save an exceptionally large proportion of its output to add to capital. This advantage, however, is partly balanced by the fact that certain older countries have had a longer time in which to build up funds for investment. Until the war disrupted their economic life the supply of capital in such countries as England, France, and the Netherlands was more abundant — not in relation to the number of workers but in relation to the effective demand for its use — than in the United States. In other words, rates of interest were lower. Those countries found it advantageous to invest a large part of their annual savings abroad rather than at home. The war changed this situation, at least for the time being. The United States has been lending to Europe to rehabilitate her war-broken industries. But the future may witness the resumption of prewar conditions as to capital in these older countries.

Since the war a considerable fraction of American savings — perhaps an eighth — has sought foreign fields, but much the greater part has gone to increase domestic equipment. The vast and expanding home market offers constant opportunity for new and profitable investment. A growing industry, such as are most industries in America, can afford more expensive plant than a stationary industry. Large-scale production, so conspicuous in the United States, usually calls for more capital per worker than does small-scale production. Moreover, the managers of American business, partly because such favorable opportunities lie before them,

are in general more ready than those of Europe to take the risks involved in heavy new investments.

Finally, the character and the situation of labor in the United States have much to do with the large use of capital. In most other countries, outside of western Europe, the laboring classes have had little opportunity for education. They are scarcely competent to handle intricate and expensive machinery. More important still, their wages are so low that it may not pay to invest much capital. It makes a great difference whether the man whose labor would be saved by the costly machine commands a wage of five dollars or a wage of fifty cents. In many an Oriental port men and women in long file toilsomely carry coal to ship bunkers. Mechanical hoists would require only a few workers, but with labor so cheap the saving would not justify the investment. Even in western Europe the wage level is enough below that in America to affect materially the decision as to the advantage of increasing the capital employed. An unhappy paradox confronts us: the more a country needs capital, the less likely it is to get it.

American economic history has been marked by rapid increase in the use of capital. This is perhaps most conclusively shown by the statistics of power in factories, for increase of power reflects increase of machinery of all kinds. The amount of power used per wage-earner is now about four times as great as in 1879 (see, further, Section 4). Significant also are the data of growth of national wealth, though this includes the value of land and of other natural resources. Per capita of the population the estimated wealth of the United States has increased from \$780 (paper-money basis) in 1870 to \$1165 in 1900, to \$1950 in 1912, and to about \$3000 at present. Allowing for the decreased buying power of money, the average is more than 50 per cent higher than at the beginning of the century (the buying power of money is now not over 10 per cent less than in 1870).

The census authorities formerly collected statistics of the value of capital used in factory industry. The figures are

rather rough approximations, but they serve to indicate the trend. The average per wage-earner rose from about \$800 in 1869 and \$1900 in 1899 to \$3200 in 1914.¹

The accumulation of capital has apparently been more rapid since the World War than at any previous period of American history. The data are striking. Some experts have estimated the average annual accretion as \$10,000,000,000, or more than one tenth of the annual income of the nation. Fig. 22 (p. 198) shows the great magnitude of certain of the forms of saving for which statistics exist; it is far from painting the picture in its entirety.

The combined total of the four items shown — additions to deposits or assets of savings banks and building associations, net life-insurance premiums, and increase of the surpluses of corporations — represents the contribution of over \$7,000,000,000 annually to the supply of capital. Of the savings made in these and other ways a large fraction, though by no means all, is invested in new securities issued by corporations or by public authorities. These are shown at the bottom of the diagram (of course the figures represented by the last two bars are not to be added to the others). The amount of new securities issued reached in 1928 more than \$8,000,000,000; this, however, is not strictly a net figure, as part represents merely change of ownership of property already existing.

As already stated, one of the conspicuous features of modern business is the large part played by corporations. Approximately four hundred and fifty thousand corporations report to the Federal government for taxation. The amount of new securities of American corporations floated has reached more than five billions annually. Most big business enterprises must take the corporate form: usually a single individual or a small group of individuals in partnership can-

¹ The average for 1919 lacks significance because the value attributed to existing capital by its owners and others naturally did not advance as rapidly during the war as prices of commodities. The figure estimated above for 1925, \$7000 per wage-earner (p. 199), is scarcely comparable.

not furnish sufficient capital. Moreover, corporations foster savings by facilitating their efficient use. A person of modest or even of considerable income often cannot profitably establish an independent business under his own management, or if he is already in such a business he often cannot advantageously use all his savings in it. The corporate form of organization makes it possible for anyone to put even a small amount of savings to work in productive enterprise. The limited-liability feature reduces risk. Most corporate securities are bought and sold constantly in open market, so that the investor can quickly withdraw; he can borrow if need be with his stocks or bonds as collateral. There are, of course, plenty of "blue sky" corporations ready to separate the unwary from his money; but, all in all, the widespread use of the corporate form of organization is a great agency for building up national capital.

Again, corporations are themselves large savers. If they are prosperous they ordinarily do not pay out all their earnings as interest or dividends. They set aside part to protect against a rainy day and to add to their future earning capacity. The addition to the surplus account of corporations during 1926 (latest available data) was \$2,335,000,000, approximately half as much as was paid out in dividends. Most of such surplus of corporations is invested directly in expanding and improving their own equipment. The remainder is used in buying securities of other corporations or in some other way which augments the productive assets of the nation.

There is an increasing disposition on the part of Americans to embark upon schemes of investment which put strong pressure on them to save money regularly over a period of time. Life insurance, membership in building associations, and the purchase of securities, homes, automobiles, and many other things on the installment plan, all demand continuous setting aside of income to pay for something already taken into possession or for some future possession or benefit. There are no doubt evils in certain of these methods: they

may lead to extravagant purchases; they may involve unfair losses in case payments cannot be kept up. On the whole, however, the practice of installment saving, if not carried too far, seems to promote thrift and to increase the total additions to capital, especially to consumption capital.

Not only is the volume of capital used in the United States enormous, but the distribution of its ownership is significant of the general well-being among the population. Participation of the masses of the people in the ownership of both consumption capital and production capital is widespread. Immense as are the fortunes of a few thousand millionaires, the larger proportion of the total national wealth is held by smaller "capitalists."

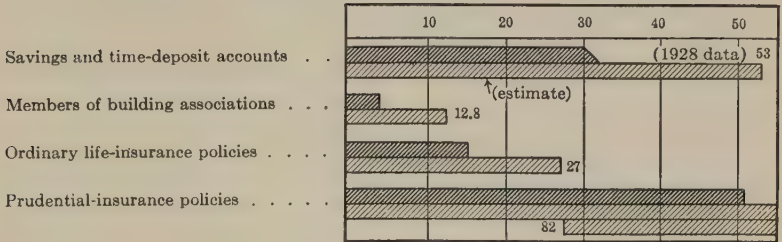
Apart from farm ownership (see Chapter VIII) and from ownership of homes and other forms of consumption capital, many millions of families possess "intangible" property representing a share in the ownership of industry. Despite very liberal spending, thrift is a conspicuous trait of a large proportion of the people. The statistics relating to the number of participants in the various recorded forms of saving and the increase in that number during recent years are quite as extraordinary as those of the sums of money involved. There were in 1928 ¹ more than 53,000,000 separate savings or time-deposit accounts in the banks, about 14,000,000 members of mutual building-and-loan associations, about 28,000,000 outstanding policies of the ordinary type of life insurance with face value averaging over \$2600 each,² about 8,500,000 policies in fraternal-insurance orders averaging over \$1000 each, and some 85,000,000 policies of prudential insurance averag-

¹ The figures are in part estimated from 1927 data shown in Fig. 23 on the basis of normal increase and partial data.

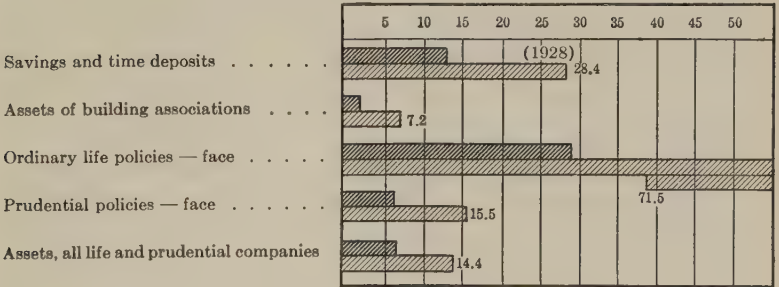
² The face value of the life-insurance policy is, of course, not comparable with the amount of a savings deposit. Since so many of the policies are newly written, the accumulated net value is equal on the average to not more than one fifth of the amount of the policy. The best measure of the amount of savings actually represented by insurance policies is the value of the assets of the companies, which, for both ordinary and prudential combined, was in 1928 not far from \$15,000,000,000.



A. NUMBER OF PERSONS, ACCOUNTS, OR POLICIES, IN MILLIONS



B. MONEY AMOUNTS, IN BILLIONS OF DOLLARS



C. RELATIVE NUMBER FOR 1927 (1919 AS 100)

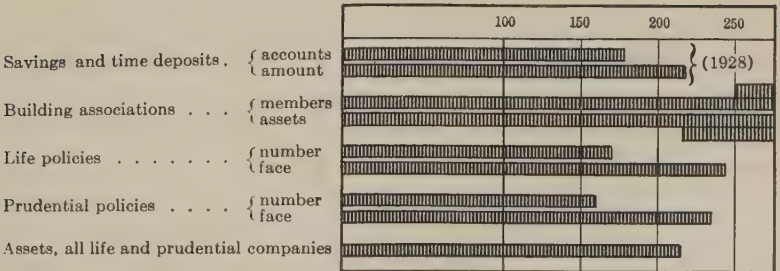


FIG. 23. Diagram showing savings and insurance — number of participants and amounts

This diagram shows only a few of the forms of savings by which the capital of the nation is built up. The savings accounts in banks represent all time deposits, including large sums held by corporations and other large individual depositors. The increase in money amounts since 1919 understates the effective gain because of the rise in the buying power of money. Prudential-insurance policies are nearly all held by families of relatively small means

ing about \$190 each. When it is borne in mind that the total number of families in the country is only about 27,000,000, it is evident that, notwithstanding the large duplication in these figures owing to the participation of a single family (or of a corporation) in several savings accounts, associations, or policies, the dominant fraction of all the families must be in possession of one or more of these forms of savings, and that often in considerable amount.

In every one of the forms of savings mentioned above the increase in number of accounts between 1919 and 1927 (1928 for savings) exceeded 60 per cent. In the case of building associations the membership trebled; although the majority of the members of such associations are borrowers repaying on the installment plan, a large fraction are small investors lending their money through this channel. The increase in the money amounts has been much greater than that in the number of accounts, and this notwithstanding the fact that the buying power of money is very much higher than in 1919. The amounts of savings and time deposits,¹ of assets of building-and-loan associations, and of life and prudential policies outstanding ranged from two and one-fifth to three and one-half times as great in the latest year reported as in 1919. One cannot but believe that the prohibition of the sale of liquor has been one of the contributing causes of this altogether remarkable expansion of savings on the part of the masses of the people.

Apart from the savings handled by these great organized agencies there are millions of persons in the United States who directly own government or corporate securities. No general statistics are available as to such holdings. Several of the great corporations number each more than 100,000 stockholders; the American Telephone and Telegraph Com-

¹ Savings and time deposits as shown in Fig. 23 must not be taken as representing merely small accounts of working-class and farm families. They include all time deposits in banks of all kinds. Some of these deposits, especially those of corporations, are of very large individual amount. There is an increasing tendency to shift from ordinary checking accounts to time accounts.

pany has over 400,000. Many corporations make special provisions for facilitating the acquisition of their securities by their employees, and in a number of cases more than half of such workers are thus participants in the earnings of the concern.

Facts such as these possess no little significance as regards the distribution of wealth. They have much to do with the conservative attitude of the working classes toward the whole economic order. They are further of importance as indicating the broad reservoirs from which additions to the nation's capital are drawn. They emphasize the efficiency of the mechanism for assembling the savings of the people and the widespread confidence in that mechanism and in the safety of investments generally. In a less prosperous society there is not only less margin for saving but less facility for making safe and profitable investments. In some countries government bonds are — or have been in the past — almost the only "intangible" investment sought by the masses of the people.

The rapidity with which capital has been accumulating in the United States is sometimes regarded with anxiety rather than satisfaction. It is urged that the industrial equipment is in danger of overdevelopment. Where, it is asked, can the ever growing product find outlet? Will not the domestic market be saturated and foreign markets witness ever fiercer competition from reviving Europe and from the developing industries of the newer and more backward countries?

That such fears are exaggerated is demonstrated by the actual experience of the past. The disaster presaged today has been prophesied often in decades gone by. Capital has been piling up and productive capacity expanding, not only in America but pretty much all over the world, through all modern history. Yet prosperity and well-being are much higher than ever before in America and in other countries not impoverished by the scourge of war. It is possible that some of the industrial depressions of the past, certainly not all of them, have been partly caused by unduly rapid expansion of industrial equipment. Even if this be granted, the effects

of each such depression have been outlived, and society has gone forward to a still higher level of production and consumption. From the broad point of view the crises of the past have been mere waves on the stream flowing steadily onward.

That, broadly speaking, the building-up of capital has all along advanced national prosperity is due to the fact that the larger part of the increased product from each accretion has been currently distributed among the people. The owners of capital, the managers of business, — whether by reason of good will or by reason of economic necessity does not matter, — have done precisely that which the prophets of disaster tell us ought to be done to save our skins. They have lowered costs and prices of their goods, have raised wages, and thus have increased the absorption of commodities by the public. Anxiety about "overcapacity" was even more prevalent just at the close of the war than it is today; yet between that time and the present American factories have added about three tenths to their output without bringing depression. The proportion exported is actually much less than in 1919 and 1920. The domestic market has taken the bulk of the increased product, partly for immediate consumption, partly to add further to productive capacity. There is no more reason to fear disaster from this larger capacity than there was in 1919.

The truth is that although consumption of this or that particular commodity may be limited, there is to all intents and purposes no bound to demand for goods and services in general. Most of us would gladly use many things we do not get at all, and finer types of those we do get. If progress continues, the future will simply witness what the past has witnessed: greater diversification and greater refinement of output. New plants and new machinery are not installed merely to multiply the quantity of things already in common use.

It is true, of course, that in some few lines there is a very real excess of productive capacity in the United States. The bicycle, for example, has lost its place; the motor cycle is

declining in popularity. Style in recent years has decreed less cloth in woman's raiment. Here and there misjudgment of demand, or ignorance of expansion plans of competitors, results in overdevelopment. But these cases are exceptions. Those who find general excess of capacity in American industry fail to make distinction between efficient and inefficient equipment. Progress breeds obsolescence. It brings new and better plants and machinery. These can produce profitably. The old remain idle, or they hang on for a time at a loss. Gradually they are sloughed off from the bottom, and from above still other equipment is shoved down into the rank of the obsolete. If all this outgrown capacity is counted in the reckoning, an excess naturally appears. Only in a static economy will plant capacity normally stand at the level of demand. Industry, like the body, has its growing pains. The dead do not suffer.

Herein lies also the major explanation of the fact that so many business concerns fail to make a profit. The returns for Federal taxation show that scores of thousands of corporations are losing money or claim to be losing it. This fact is sometimes held up as evidence that although business in America is active, it is scarcely profitable. But the true explanation is that rapid progress in methods is bound to cause losses on the part of concerns that fail to keep the pace. The proportion making profits would no doubt be higher in a more static economic life.

SECTION 4. THE USE OF HEAT AND POWER

The United States stands much ahead of any other country in the use of power and heat as aids to production. Its rich resources as regards power have been described in Chapter IV. Its people have already made vast enslavement of these genii of nature, and each year they bind more of them to the wheels of industry. Statistics of mechanical power are the more significant because they reflect the broader phenomenon of the employment of capital.

No one can determine closely how much heat and power are actually generated in the United States. The capacity of prime movers furnishes no criterion, since a given engine or other power-generator may operate twenty-four hours in the day, or eight hours (the normal time in most factories), or only an hour or less, as with the average passenger automobile. The best approach is by determining the aggregate consumption of fuels and the capacity of water-power plants.

The United States yearly consumes coal, oil, gas, and water energy equivalent to approximately 950,000,000 tons (of 2000 pounds) of coal. This figure holds substantially both for the production of these sources of energy and for their consumption, since export and import approximately balance. This quantity of coal represents stupendous energy. Were it all burned under engines of the average efficiency of those now in use, which require about three pounds to generate one horsepower for one hour, it would produce more than 600,000,000,000 horsepower hours, or the equivalent of more than 250,000,000 mechanical horses working eight hours per day and three hundred days in the year. Reduced to a per capita basis, the country uses the equivalent of eight tons of coal yearly for each person in the population, a quantity sufficient to keep two mechanical horsepower at his service eight hours or more of every secular day.

Of course those in the population who actually work with mechanical power or "process" heat have a far larger measure of such aid. For each such person, during the hours of the day in which he is himself employed, there is at work on the average energy equivalent to from 12 to 15 mechanical horsepower.¹ His puny strength is thus multiplied more than a hundred times. In factories the installed power equipment has a capacity of over $4\frac{1}{2}$ horsepower per wage-earner; besides, manufacturing industry consumes at least as much fuel and water energy for other purposes. The hissing metal pouring from the blast furnace represents

¹ In this calculation fuel used for household, office, farm, and similar purposes, and for passenger automobiles is disregarded.

just as truly the work of a mighty man-aiding energy as the great rollers which shape that metal into rails and other forms. Mine workers make approximately as much use of mechanical force as those in factories, and railway employees use far more.

The United States produces about two fifths of all the coal of the world, seven tenths of its petroleum, and an even larger proportion of all the natural gas (not counting that wasted), and its developed water powers constitute more than one third of the aggregate for all countries. If we combine these four sources of energy in terms of coal equivalent, we see that this country is the producer of nearly half (about 48 per cent) of the world's total, and consumes about the same proportion (see Fig. 24). It is no

wonder that American industry is exceptionally productive.

For a good many countries the amount of fuel consumption is quite different from that of production. England and Germany, for example, are large exporters of coal; France and Italy are large importers. Most European countries import petroleum. Canada buys much coal and oil from the

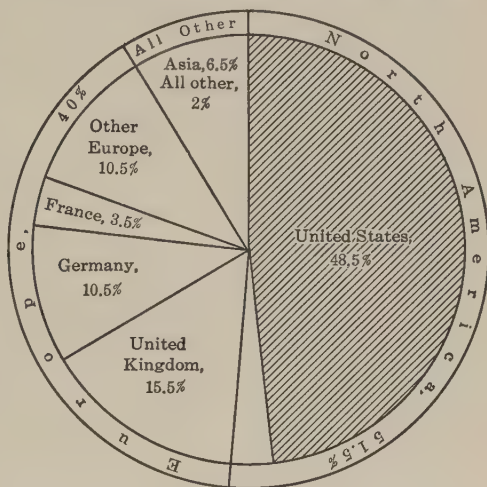


FIG. 24. Relative importance of continents and principal countries in production of mineral fuels and water power, 1925

The production of each of the mineral fuels and the installed capacity of water wheels in each country have been ascertained or estimated. The figures have then been converted to the equivalent of coal, making possible a distribution of the combined total for the world among continents and countries. All the figures are subject to a certain margin of error, especially by reason of differences in the quality of coal and petroleum produced in the several countries and of differences in the proportion of the possible time during which water energy is actually applied. Since 1925 increased production of petroleum in South America has raised its proportion

United States. Fig. 26, A, indicates, on a per capita basis, the relative consumption of mineral fuels and water energy (combined as one total) in a number of leading countries. It shows that the United States uses in proportion to population about 20 per cent more of these sources of energy than Canada, the second country in rank; two thirds as

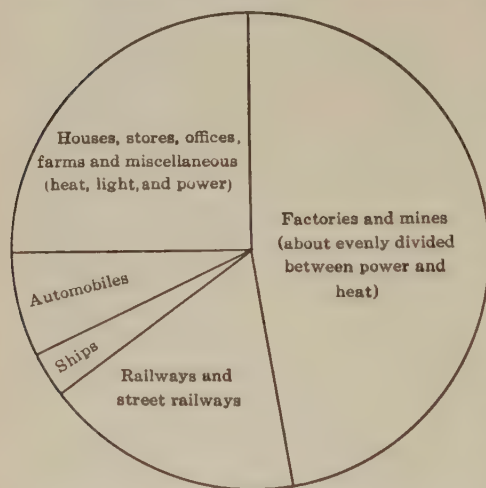


FIG. 25. Diagram showing the relative importance of the principal uses of fuel and water power

The consumption of each class of mineral fuel for each purpose, or the amount of water power applied to it, has been ascertained or estimated. All the figures have then been converted to the equivalent of coal, making possible a distribution of the total among the several uses. The data are subject to a considerable margin of error; they relate to 1927

same quantities. The smelting of metals requires enormous use of fuel; the blast furnaces for iron alone consume about one tenth of all the coal produced. Large amounts of heat are also employed in the subsequent working of metals, in the distillation of petroleum and other liquids, in the refining

much again as the United Kingdom and Belgium, which lead among European nations; more than three times as much as France or Germany; and more than ten times as much as Italy or Japan.

Fig. 25 shows in approximate fashion the relative magnitude of the various major uses of fuel and of water power.¹ Factories and mines account for not far from half the total; in these two branches, taken together, power and process heat probably claim about the

¹ In this calculation fuel used by central electric stations is distributed proportionately among the several ultimate uses of current. Firewood is not taken into consideration; there are no data regarding it.

of sugar, in the manufacture of brick, glass, pottery, and rubber goods, and of many chemicals.

Transportation takes approximately one fourth of the supply of power. The vast volume of traffic and the long distances explain this high proportion. The ubiquitous motor car is a new claimant; but, despite the swift upswing in the consumption of the sprightly "gas," that vehicle as yet accounts for only about 7 per cent of the total fuel of the country. So-called "domestic" consumption, which includes that of stores, farms, etc., as well as of homes, represents somewhat over one fourth of the total use of mineral fuels and water power. Americans use much more artificial heat in their buildings than any other people except the Canadians — several times as much as is customary even in northern Europe. This is partly due to the climate, but largely to the exacting standards of comfort. Domestic fuel consumption also goes to furnish large and ever increasing quantities of light, heat for cooking, and power for various uses in the home, office, store, or farm.

Perhaps no single indicator points more clearly to the advance in American industry than the increase in the production and consumption of sources of power. The rapid rise of manufactures, mining, and transportation has called for ever greater use of energy; conversely, the discovery and development of new supplies of fuel and water power have been a major factor in making possible the progress of industry.

A century ago mineral fuels were scarcely produced at all in the United States, and even the use of water power, then the chief prime mover, was relatively insignificant. In the seventies of the last century the combined consumption of all fuels (including a rough estimate for firewood, which was then more important) was less than one fourth as great per capita as it is today. The equivalent in coal of all the mineral fuels consumed (but not counting wood) and of water power was then equal to about one and one-half tons for each person annually; by the beginning of the present

century it had reached about four tons, and it is now eight tons. It should be emphasized, moreover, that the increase in the amount of heat and power generated from fuel has been much more rapid than the increase in the quantity of fuel used. There has been marked advance in the efficiency of boilers, steam engines, and internal-combustion engines, in the methods of applying process heat in industry, and in the methods of burning fuel in the home. It is probable that the energy actually generated from fuels and falling water in the United States is today fully ten times greater, per capita of the population, than it was fifty or sixty years ago.

The statistics of service performed by fuel and power confirm the evidence of great increase in their use. In 1870 engines and water wheels in the factories were rated at 2,346,000 horsepower. Adding an estimate for mines we have a total of perhaps 3,000,000. By 1900 this amount (adding in the new factor of central electric stations) had reached about 15,400,000; at present it is about 65,000,000 horsepower. Industrial horsepower capacity has thus multiplied more than twenty-fold since 1870. Pig-iron production has also increased over twenty times since then. Reduction of other metals by smelting and refining has advanced even faster. The volume of railroad traffic has multiplied many times. In the meantime large new applications of heat and power in industry and transportation have developed: the motor car, the farm tractor and gas engine, the reduction of aluminum, and the manufacture of many new chemicals and of many advanced metal products, in making which great quantities of process heat are required. The household consumption of fuel has likewise increased much faster than the population, to say nothing of the greater amount of heat drawn from each unit used. The old-time roaring fireplace usually warmed only one or two rooms of the house; in winter ice froze in the bedrooms. At present a large proportion of American homes are warmed throughout by central heating.

The Saving of Fuel

Abundant and relatively cheap as are fuels and water energy, any saving in their use through more efficient methods is of great importance to the national well-being. Due regard for future generations demands that the limited supplies of fuels be conserved. Economy in industry, transportation, and household management requires that as much energy as possible shall be got out of the fuels burned and the waters turned to service. The outgo for heat and power is one of the largest items in the bill of national expenditure.

Attention is called elsewhere to the spread of conservation in the mining of coal and in the prevention of waste of natural gas (Chapter IX, Sections 4 and 5). We shall see also that the ever greater harnessing of waterfalls has saved much fuel. Another equally important form of conservation is the improvement of methods of deriving heat and power from fuel.

Advance in this respect is no new thing. From the earliest days of the steam engine the technician has cudgeled his brain and the capitalist his pocketbook in the effort to squeeze more energy out of coal. The United States has perhaps contributed no more than its share to the progress. England and Germany have led in the development of the marine engine and the crude-oil internal-combustion (Diesel) engine. The United States has probably led, at least recently, in the improvement of the stationary steam engine, the gasoline engine, and the electric dynamo and motor. The science and art of power engineering have been assiduously cultivated in the country during the last two or three decades. Professional coöperation goes far to put at the service of all the discoveries and inventions made by each. Ingenious recording devices furnish a mass of data by which to judge the actual operating results of fuel consumption and power generation.

An important factor in saving fuel has been the ever increasing scale of industrial operations, permitting the ad-

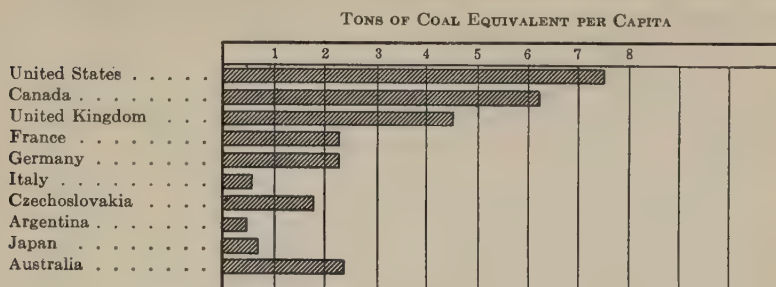
vantageous use of bigger power installations. The recent transfer of a great part of the task of generating power to huge central electric stations has been of particular significance in this direction. Even as late as half a century ago there were few steam engines with a capacity exceeding five hundred horsepower; now there are many of a hundred times that size. The turbine engine, which, when of large size and operated at high speed, is much more efficient than the reciprocating engine, is especially characteristic of electrical application of power. Moreover, huge power plants are able to apply many technical devices for economizing fuel which would not pay in small installations.

Progress in the methods of utilizing fuel for industrial processes has been not less marked. The gases generated in turning coal into coke, in smelting iron and other metals, and in various other industrial processes were formerly wholly wasted; now for the most part they are effectively put to work. Often, too, it is found that heat can be better applied by converting coal into gas. Larger and better blast furnaces and other installations for applying heat to metals and their products have saved much fuel. Scientific methods of testing fuels, of recording the results obtained, of adjusting automatically the quantity burned to the work required, have accomplished much. There has been no little advance also in the methods of household heating.

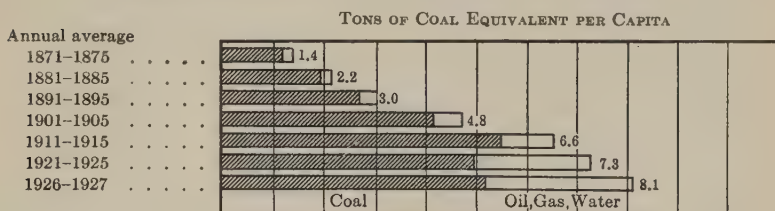
It is possible to secure a rough measure of the recent progress in economizing fuel in the United States. The increase in the total consumption of mineral fuels is readily calculated, and there are approximate indicators of the quantity of power and heat derived from them. Fig. 26, *D*, compares the period just before the war with recent years.¹ The total consumption (in terms of coal) of coal, fuel and gas oil, and natural gas rose from about 568,000,000 tons

¹ Firewood consumption has probably declined slightly, but there are no satisfactory statistics. Consumption of gasoline and kerosene has increased greatly, but there are no data as to the heat and power derived from them; as to automobile mileage, for example. The calculations omit these forms of fuel.

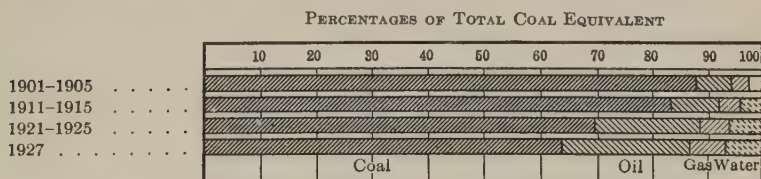
A. COMPARATIVE CONSUMPTION OF MINERAL FUELS AND WATER POWER, 1925



B. GROWTH OF PER CAPITA CONSUMPTION IN THE UNITED STATES



C. RELATIVE IMPORTANCE OF MAJOR SOURCES OF POWER



D. INCREASE IN EFFICIENCY OF FUEL APPLICATION

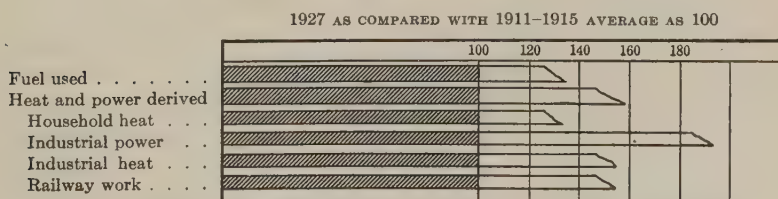


FIG. 26. Diagram showing statistics of mineral fuels and water power

The coal equivalent of other mineral fuels and of water wheels has been estimated, a certain margin of error resulting from differences in the quality of coal itself and of petroleum and differences in the proportion of the possible time during which water energy is applied. As to section *D* see text; the bars represent relative numbers; for example, the amount of fuel used in the country in the later period was from 130 to 135 per cent of the amount before the war

annually in 1911-1915 to about 757,000,000 tons in 1927, or by about 33 per cent. This increase was greater than that in the population of the country, which amounted to about 23 per cent, but it was much less than the increase in industrial production and transportation. Some idea of the greater volume of service secured from fuel is gained from the following facts: (1) the capacity of prime movers (excluding water wheels) in factories, mines, and electric stations grew during this period by about 65 per cent; (2) the volume of traffic moved by the railroads increased 54 per cent; and (3) the tonnage of pig iron produced increased 33 per cent, that of steel ingots and castings 58 per cent, that of copper 40 per cent, and that of manufactured gas 150 per cent. Many other similar marked increases could readily be cited. Supplementing the available data by estimates as to other results attained by the use of fuel, including an especially rough estimate as to the quantity of household heat generated, we may reach the conclusion that the aggregate work obtained from the fuels mentioned must have been from 55 to 60 per cent greater during these recent years than during the immediate prewar period, as against the addition of 33 per cent to the quantity consumed.¹ The annual saving of fuel through more efficient application must reach the equivalent of more than a hundred million tons of coal.

The future is bound to witness still further achievement in the economizing of fuel. The advance of the last few years has been particularly rapid. The best installations already existing are far superior to those more commonly employed. Year by year more concerns will follow these leaders. The central electric plants of the United States reduced their fuel consumption per kilowatt hour of current

¹ The minimum percentage given for increase in aggregate work performed is based on the assumption that the quantity of domestic heat generated has increased only as much as the population (23 per cent), and the maximum percentage on the assumption that it increased about 33 per cent. For industrial heat the minimum increase in work accomplished is put at 45 per cent and the maximum at about 55 per cent.

by 45 per cent between 1919 and 1928. The railways are now getting about one fourth more work (gross weight hauled) out of the coal burned in locomotives than they did fifteen years ago. The end is not yet.

The Several Sources of Heat and Power

Coal is by far the most important source of heat and power in the United States, as in most other countries. Its position, however, is less dominant than formerly. The combined output of mineral fuels and water power in terms of coal equivalent averages about 950,000,000 tons annually, of which coal itself represents about 610,000,000, petroleum 205,000,000, and natural gas and water power each from 65,000,000 to 70,000,000 tons.¹ The past has witnessed marked shifts in the relative importance of these sources of energy. A century ago the steam engine was in its infancy. Water power ran the factories, then of minor importance. Firewood was almost the sole household fuel. Fifty or sixty years ago wood still led in domestic heating. On the railroads, however, which then as now rivaled the factories as users of power, coal was burned almost exclusively. In 1870 approximately half the capacity of prime movers in factories was in the form of water wheels, a far larger proportion than at present. Petroleum became of importance as an illuminant during the seventies, but for a long time it was little used for other purposes.

By the beginning of the present century oil and natural gas were coming into application as sources of heat and

¹ Averages for 1926-1928 are: coal, 608,000,000 tons; petroleum, 858,000,000 barrels; natural gas, about 1,400,000,000,000 cubic feet; capacity of water wheels, about 12,500,000 horsepower. One ton of coal is taken as equal to 4.2 barrels of oil or 22,000 cubic feet of gas. Each water horsepower is assumed to operate on the average 3600 hours per year, and the coal equivalent is calculated on the basis, probably now somewhat too high, of three pounds of coal per horsepower hour. Firewood, not covered by the diagram, is at present probably somewhat less important than water power as a source of energy. As regards the geographic distribution of the production of these sources of energy see Chapter IV, Section 5.

power. There had, however, been little advance since 1870 in the harnessing of water power. Of the combined energy of the mineral fuels produced and the falling water used, coal in 1901-1905 furnished 89 per cent, oil and gas 9 per cent, and water only 2 per cent. Since that time change has been rapid. Output of petroleum and gas has grown by tremendous strides. More efficient water wheels and electric transmission have given strong impetus to the development of water power. Coal production has consequently increased less rapidly than before; indeed for the last decade or more there has been little or no upward trend in output. From about 340,000,000 tons annually between 1901 and 1905, it has now reached about 610,000,000 tons, but meanwhile the coal equivalent of oil, gas, and water power has risen from 50,000,000 tons to approximately 335,000,000 tons. The proportion of coal in the combined total has dropped to about 64 per cent, whereas that of oil has advanced to 22 per cent, and that of gas and of water power to about 7 per cent each.

These changes, together with economies in the burning of coal itself, have joined with still other causes to bring depression to the bituminous-coal industry. Though much petroleum goes into new uses which coal could hardly serve, a good deal of it, as well as practically all the gas and the water energy, competes with fuel. The coal-mine operator has been one of the many victims of economic progress. However, the coal industry is far from dead. The prospect for long continuance of the present huge output of oil and gas is somewhat doubtful. Although increasing abundance of capital will lead to the taming of more water energy, there are ultimately very definite limits to expansion in this direction. The recently found methods of extracting liquid fuels from coal tend to strengthen its position. Unless some wholly revolutionary discovery in the power field intervenes, coal will be indefinitely an economic factor of vast importance. Further discussion of the coal and petroleum industries is presented in Chapter IX.

SECTION 5. ELECTRIC POWER

Great and Increasing Use of Electric Current

The most conspicuous development in the power field during recent years is the use of electricity. The electric current now plays a vastly important part in America. It illuminates the homes, lightens the burdens of household work, operates the larger part of the industrial machinery, and is a big factor in transportation.

The annual production of electric current in the United States is not far from 115,000,000,000 kilowatt hours, or about 950 kilowatt hours per inhabitant.¹ A kilowatt hour represents one and one-third horsepower, so that for each person in the population the equivalent of the effort of one "mechanical horse" works over three hours per day in the form of electric energy. In 1928 so-called public-utility electric plants — central electric stations and electric railways — generated nearly 88,000,000,000 kilowatt hours, approximately 24,000,000,000 were generated by factories and mines for their own use, and a considerable (unreported) quantity was generated by the steam-railway companies, which have electrified certain important city terminals and certain sections of the lines through mountain territory in the West.

World statistics have scarcely kept abreast of the rapid progress of electrical development. The available data indicate that the United States produces about half the total current generated. The only countries where the per capita output exceeds that in the United States are Canada, Norway, and Switzerland. These countries lack sufficient coal but possess great water-power resources, so that they have naturally turned strongly to hydroelectric power for industry and transportation. The household consumption of current is probably greater in proportion to the population in the United States than in Norway or Switzerland. In the

¹ Data for 1928. The annual increase in output is roughly 10 per cent.

leading industrial countries of Europe, such as England, Germany, France, and Italy, although the proportion of industrial machinery operated electrically is approximately as high as in America, the total production of current per capita is much less than half as great.

It is one of the major services of electricity the world over that it has made possible far greater use of the power of falling water, that unwasting force the utilization of which conserves the limited supplies of mineral fuel. Without the possibility of transporting that energy over the potent wire, multitudes of waterfalls now harnessed would be hurling themselves down uselessly. The total developed water power in the United States has multiplied at least ten times since 1900, and the entire increase has been in hydroelectric plants. At the present time two fifths of the electricity produced by public-utility companies is derived from falling water. The expansion in the hydroelectric field in the post-war period has been extraordinary; the output of current from water-power plants rose from 14,600,000,000 kilowatt hours in 1919 to 34,700,000,000 in 1928, or by over 137 per cent, whereas the current derived from fuel increased about 119 per cent in the same period.

Fig. 27, which is based in part on estimates, shows the relative importance of central stations and of factories and mines in the generation of electricity, and also the importance of the major uses to which the current is put. There are no data for the output of steam-railway companies or of small private plants. The latter, however, is relatively insignificant.

The first modern use of electric current as a source of energy began about 1880, and for about a decade it was virtually confined to lighting. Then came a revolution in urban transportation. The long-suffering car horse quickly disappeared. The service, immensely improved in speed and comfort, grew by leaps and bounds. The electric railways soon became the biggest user of current. In the meantime, however, certain factories (notably steel mills) had come to learn the advantages of the electric drive, and by about

1910 industrial application of electricity outranked all other uses. For the past ten or fifteen years the gain in industrial consumption of current, although rapid, has been matched by renewed acceleration in the growth of domestic consumption. The motor vehicle has checked the development of electric railways. At the present time, not counting line losses and self-consumption of the central stations, about 66 or 67 per cent of the current is used for industrial power and other industrial purposes, 23 or 24 per cent for light and other domestic purposes, and 9 or 10 per cent for street-railway power. In this statement the current generated by steam-railway companies is not taken into account. In the year 1902 the total electric current generated by all classes of producers was approximately 7,000,000,000 kilowatt hours, not more than one sixteenth of the present annual output (Fig. 28, A). During the years since the war public-utility companies (central electric stations and street railways) have been adding about 10 per cent each year (compounded) to their output; it was two and one-third times as great in 1928 as in 1919.

The relative importance of different states and sections in generating electric current depends primarily on the

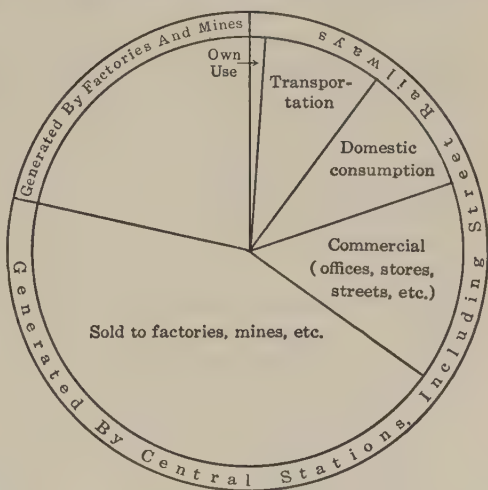


FIG. 27. Diagram showing the relative importance of the principal uses of electric current in the United States

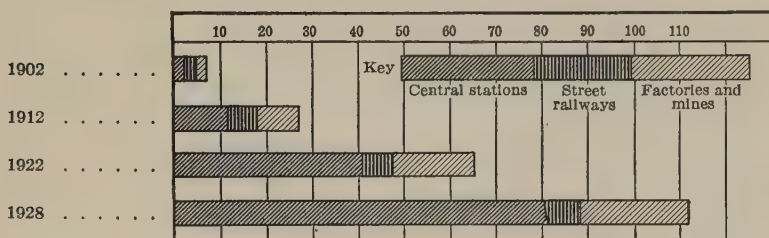
The diagram distinguishes current generated by central stations from that generated by factories and mines. The factories and mines use nearly two thirds of all the current, but they themselves generate only somewhat over one fifth. The output of small isolated plants and of steam-railway companies is omitted. Losses of current are disregarded. The data relate to 1927

density of population, the average income of the people, and the extent to which manufacturing and mining industries are developed. Fig. 29, *A* and *B* (p. 227), relates only to the output of public-utility companies. If the current generated by factories and mines were included, the bars would be materially lengthened. Over 55 per cent of the total output of public-utility companies is in the highly industrialized New England, Middle Atlantic, and East North Central divisions. In proportion to population, however, the Pacific coast leads the East in electrical development. The reason is that water energy is abundant and coal dear, so that nearly all the mechanical power in service is applied by electric motors. The disparity between East and West would be less marked were the output of factory-owned electric plants added. The use of electricity is naturally much less in the agricultural states of the Middle West and South, although the output for industrial purposes is large in several of the South Atlantic states. It is a notable evidence of the growth of factories in the South Atlantic division that the quantity of electric current generated there more than quadrupled between 1917 and 1928, an increase scarcely equaled anywhere else in the country. The relatively high cost of distribution in the rural districts is the chief factor holding down the consumption of electricity by the farming community.

Growth of Central Electric Stations

The generation of electricity has become a great industry. In the United States it is chiefly in private hands. The bulk of the output is produced by concerns which make a business of selling current to the public. Economy is attained by concentrating in huge plants the supply of energy for multitudes of factories and still greater multitudes of homes. The income of central electric plants rose from \$84,000,000 in 1902 to \$502,000,000 in 1912 and to over \$1,800,000,000 in 1927; the latter sum is equal to about three tenths of the gross receipts of the railways.

A. OUTPUT OF ELECTRIC CURRENT IN UNITED STATES, IN BILLION
KILOWATT HOURS



B. ELECTRIC-POWER EQUIPMENT IN FACTORIES

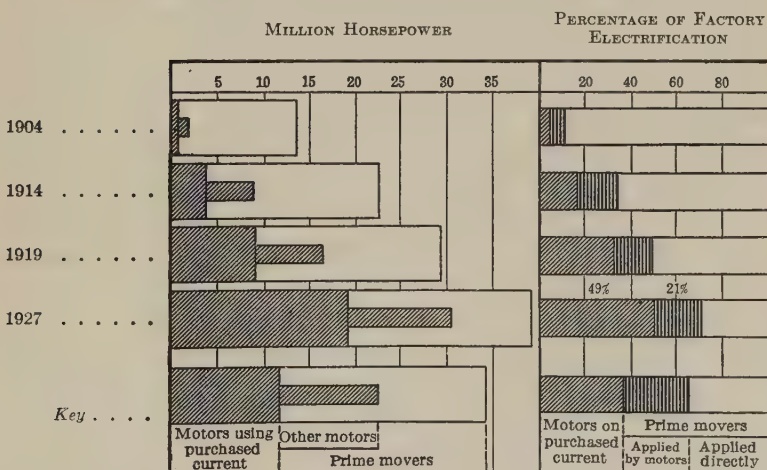


FIG. 28. Diagram showing the growth in output of electric current and in the electrification of factories

Section *A* does not include the output of electrified sections of steam railways. The absolute figures at the left in section *B* represent the actual capacity of electric motors in factories, distinguishing those run by current generated by prime movers of the factories themselves. But the capacity of the prime movers used for this purpose is less than that of the motors; the ratio is estimated at about 72 per cent. At the right of the diagram this fact is taken into account in calculating the proportion of electrification and the share furnished from each source

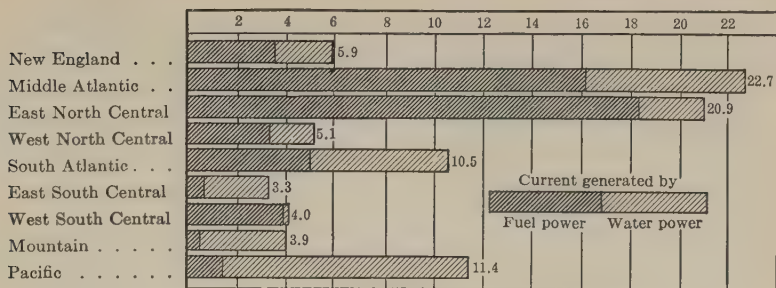
The central electric plant is not merely the producer of a commodity, and thus akin to a factory: it is also engaged in distribution, resembling somewhat a railway or a telephone company. The major fraction of the investment

and expense in the supply of household current has to do with distribution. This is not true, of course, of current furnished in great volume to factories and other large consumers. In 1928, according to estimates of the National Electric Light Association, twice as much electricity was sold to factories, street railways, and other large consumers as to households, stores, and other small users, but the gross revenue from the latter group was the greater by about 80 per cent.

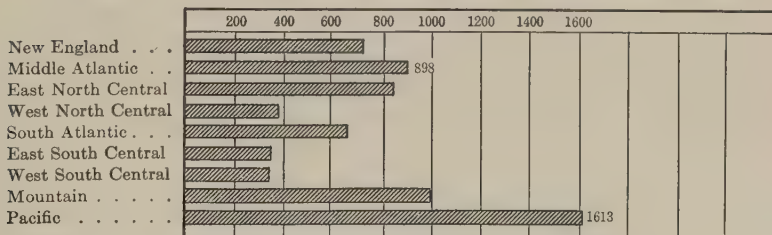
The geography of the electrical industry reflects the joint working of physical and economic causes. Consumption of current is largely concentrated in cities and industrial areas. Water-power sites and coal mines, the prime sources of power, often lie far away. In the case of water power there is no choice but to generate the current on the spot and to transmit it, up to the limit of distance imposed by cost of line investment and line losses, to where it is required; often high-potential lines carry electricity two or three hundred miles. There are some instances in which industry moves to the power site. Niagara has wooed to its banks many great factories.

As for the fuel-burning plants, it appears at first thought that the choice lies open between carrying coal and carrying electric current, at least up to the limit of efficient transmission. However, the choice is by no means always free. This is because enormous quantities of water are required for condensing steam if the greatest efficiency is to be got out of the engine. A modern electric station uses five hundred tons or more of water for every ton of coal. The electric plants of the country pump several times more water than all the municipal water systems. In some of the coal-mining regions the supply of water is not sufficient. As a matter of fact, at present nearly all the fuel-burning stations which supply large cities are situated either within the cities or close to them. Almost invariably they stand at the very margin of some large stream or body of water, the engines being barely above the level in order that the minimum of energy may be spent in pumping. Manhattan Island is the site of several huge electric plants, although its extreme

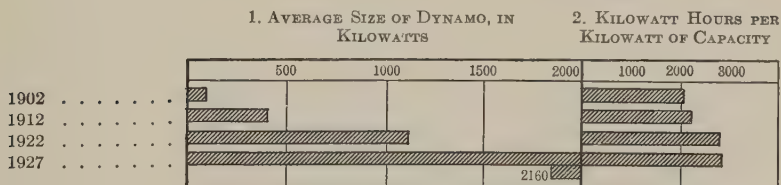
A. OUTPUT OF CENTRAL STATIONS, IN BILLIONS OF KILOWATT HOURS



B. OUTPUT OF CENTRAL STATIONS PER CAPITA, IN KILOWATT HOURS



C. INDICATORS OF CENTRAL-STATION EFFICIENCY



D. POUNDS OF COAL BURNED PER KILOWATT HOUR

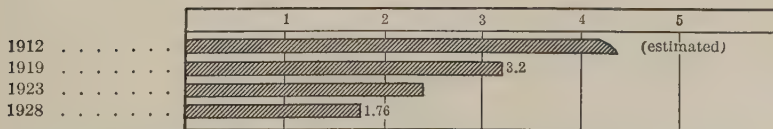


FIG. 29. Diagram showing output of central-station electric current by geographic divisions, and indicators of increase in efficiency

Sections A and B (1928 data) relate only to current generated by central electric plants (including street railways); the relative totals would be somewhat different if power generated by factories, mines, and steam-railway companies were included. Section C, 1, shows the increase in the average size of the dynamos in central stations, section C, 2, the relation between the capacity of dynamos and the actual output.

Section D shows the amount of fuel used per unit of output of current

density of population for the most part shuts out big factories. On the other hand, the advantages of large electric stations are such that in many towns of medium or small population local companies which formerly produced electricity themselves now confine their operations to the distribution of current purchased from larger plants.

The Advancing Efficiency of Electric Plants

The electric-power industry has made rapid strides in efficiency. In this progress lies one of the explanations of its swift growth. In turn that growth has been a major factor in cutting down the cost of current.

The saving of fuel has been especially remarkable. In 1919, when the records begin, the central stations consumed the equivalent of about 39,000,000 tons of coal in generating 24,000,000,000 kilowatt hours. In 1928 the corresponding figures were 46,500,000 tons and 53,000,000,000 kilowatt hours. The average consumption was brought down from 3.2 pounds of coal per kilowatt hour to 1.75 pounds (Fig. 29, *D*), or by 45 per cent. There is reason to believe that before the war it took from 4 to 5 pounds per kilowatt hour. The general average can still be much bettered by bringing inferior plants up to the best standards set. Many stations burn less than $1\frac{1}{2}$ pounds per kilowatt hour, and in a few instances where the load is exceptionally steady the amount falls even to 1 pound.

The electric plants have been able to cut down the cost of labor in the face of advancing wage rates. The number of wage-earners employed was about six and one-half times greater in 1927 than in 1902, whereas the output multiplied nearly thirty times.¹ The modern electric station is conspicuous for the small number of men attending it. There is

¹The number of salaried employees, to be sure, has increased much more than the number of wage-earners, multiplying about fourteen times; this is due to the increasingly elaborate accounting and the greater effort connected with sales and distribution.

almost complete absence of manual labor. Gone are the grimy, sweating stokers. Hand never touches coal from vessel or car to roaring flame. The men are few in the engine room as well; it takes scarcely more attention to run a modern 50,000 or 100,000 horsepower engine than an old-fashioned one of 50 horsepower.

The electric-power industry has invested capital in vast sums to save material and labor; but it has been fortunate in that the efficiency of equipment has so advanced that the reported average investment per unit of output has actually fallen materially. During the course of the year 1912 the central stations turned out about 5.3 kilowatt hours for each dollar of their investment (including the investment in distribution facilities); in 1927 the ratio was over 8 kilowatt hours per dollar.

The advance in efficiency has been due in large measure to the increase in size of plants resulting from the general expansion of the business and from consolidation of producing concerns. Large-scale operation has permitted the use of bigger boilers, engines, and dynamos. At present (1927 data) the average central station has a dynamo capacity of about 6000 kilowatts, some fifteen times the average of a quarter of a century ago.¹ Averages, however, give no conception of the vast size of the bigger plants. Several exist which have the power of more than half a million "mechanical horses," the single plant possessing roughly half as much as the total capacity of all central stations combined twenty-five years ago.

A modern power plant is an impressive spectacle. The huge building is constructed with the utmost massiveness, of steel and concrete. Its smokestacks tower three or four hundred feet into the air. The boilers with their overhead equipment of coal-feed and heat-economizers are more than a hundred feet high; one of them burns fifteen or twenty tons each hour. In the lofty engine room squat a long line of monster turbo-generators, a single one of which may pour

¹ Fig. 29, C, shows that there has been even greater increase in the average size of the individual dynamo.

forth the power of fifty or a hundred thousand horses, sufficient to light a large city or to move the machinery of hundreds of factories. These engines betray their stupendous energy by no boisterous effort: they work with a smooth hum. They appear simple enough in their massive shells of steel; but within are many thousands of parts, big and little, delicately shaped and patiently put together. To give these great power units their full might and economy, dozens of subsidiary engines and motors are at work. These crush and convey coal, automatically stoke the furnaces, supply forced draft, create vacuum, pump water, and perform other mysterious but useful functions. Everywhere are devices for wringing from heat and steam the last bit of energy that is worth the cost of recovery.

Satisfactory electric service means ability to meet any demand, to handle peak loads instantly. The load varies from season to season, from day to day, and from hour to hour. With the sudden darkening of a storm multitudes of lights flash out. To cut down any of these variations cuts down capital cost per unit of output; to smooth out the sudden changes within the day saves fuel as well. The increase in the size of plants has done much to steady the daily load curve. A station supplying scores of thousands of homes and hundreds or thousands of factories matches fluctuation against fluctuation as no small plant can. Modern stations possess remarkable automatic equipment to secure immediate adjustment of fuel consumption to those sudden changes in current requirement that cannot be escaped. A good many plants have recently installed boilers fed by pulverized coal (blown in very much like liquid fuel), a method which permits almost instantaneous adaptation to such changes with minimum loss of heat.

The fact that central stations supply current for a great variety of uses helps to iron out somewhat the broader waves in the load. A station confined to lighting would find most of its capacity idle the greater part of the day, especially in summer. Factories and street railways (street rail-

ways now largely buy current from central stations) make demand during a number of hours when little light is being used. Nevertheless there is a peak period toward the close of the afternoon, particularly in winter, when almost every form of consumption makes clamorous demand, and when the load may be greater by 50 per cent or even 100 per cent than in the middle of the day, to say nothing of the late night hours. Consequently central stations must have a capacity decidedly in excess of average requirements. The actual output of current in general is only about one fourth of the theoretically possible total if plants could run evenly twenty-four hours in the day and throughout the year. Down to about fifteen years ago central electric stations, owing to the widening of their field of supply, gradually increased the ratio of annual output of current to the installed capacity of dynamos (Fig. 29, C). Since then the ratio has been practically stationary, the explanation being that the plants are constantly installing new equipment of greater efficiency, and still retaining old equipment for possible emergencies.

In recent years there has developed a practice of hooking together central electric stations over large areas, either by establishing a common ownership or merely by contracts for mutual purchase and sale of current. This so-called "super-power" movement differs only in degree from that expansion in the area covered and the uses supplied by big individual electric plants which has been going on from the outset. Widespread interconnection permits a certain offsetting of peaks in one locality against troughs in another, especially where a standard-time meridian is crossed. It also helps to meet breakdowns or other extraordinary emergencies.

Electric Power in Industry

Great as is the service of electricity in lighting and in railway operation, its application to manufacturing and mining industry is perhaps even more significant. This application has cheapened the cost of goods and has influenced

in very considerable measure the geographic distribution of factories. The future may readily see far greater changes as a result of "electrification" of plants. At least seven tenths of all the machinery in American factories is already electrically driven, and the rate of increase in the use of this method is exceedingly rapid. Only as far back as 1914 the proportion was but one third, and ten years earlier it was one tenth (see Fig. 28). In fact, the whole of the great expansion of power equipment in factory industry for over twenty years has taken this form, the capacity of engines and water wheels whose energy is directly applied to moving machinery being somewhat less at present than in 1904.

In the earlier days of electric application of power the motors were chiefly driven by current generated by the factories and mines themselves. The steel mills were the first to introduce the electric drive on a large scale, this method being peculiarly adapted to facilitate the quick starting and stopping of machines so important in rolling steel. Since these mills must use great quantities of heat in processing metal, it is natural that they should still find it economical to generate their own electric current. During the past fifteen or twenty years, however, the great majority of the electric motors newly installed in factories and mines have been operated by current bought from central electric stations. Seven tenths of the motor capacity in manufacturing plants now works on purchased power.

The degree of electrification of industry varies materially in different branches and in different sections of the country. Since electric power is a modern thing, it naturally finds its greatest use in new and rapidly expanding industries. Marked variations appear among industries with regard to the character of the machinery employed and its placement in the plant; these affect the advantage to be gained from electric drive. Among the sixteen great groups of manufacturing industries there are eight in which electrification had already in 1927 been carried to the extent

of three fourths or more.¹ These are the transportation-equipment group, dominated by the swiftly growing automobile industry; the machinery group (in both these the proportion is about nine tenths); and the groups of nonferrous metals, rubber, printing and publishing, the stone, clay, and glass industries, railroad shops, and miscellaneous industries. In all but one of the other groups the electrification was over 50 per cent. By reason of the scarcity of coal and the large development of hydroelectric energy the proportion of manufacturing industry operated electrically is highest in the Pacific division, being about 77 per cent in 1927. In the East North Central states, however, although most of the power is derived from coal, the proportion was almost as high, largely because of the great development of the automotive, rubber-tire, and machinery industries in that region.

The electrification of factories is due to a number of causes. Most important, perhaps, is the economy thus secured in conveying energy from the prime mover to the actual working machinery. Heavy cost and waste of energy is involved in a complex and far-extended system of transmission by shafts, belts, pulleys, reduction gears, and similar devices. In many cases, too, the time of workers is saved by the electric drive, with its quick and responsive control of energy. In some cases automatic devices start, stop, and change the speed of machinery with extraordinary ease and economy. For example, the huge centrifugals in sugar factories must be brought from a standstill to a speed of several thousand revolutions a minute and again to a standstill, all within four minutes. Intricate automatic devices turn on the electric power in proper doses, and the momentum of each centrifugal as it slows down contributes to supply energy to the others. The use of electric current from a central station enables the small factory or the factory of medium size to get the benefit of the economies of capital and fuel that lie open to

¹ The groups distinguished in these statistics are not entirely identical with those shown in the diagrams of Chapter X.

big-scale power production. Moreover, the purchase of power enables the factory to care for peak loads without excessive investment in power equipment. The number of machines actually at work may vary greatly with the seasons or with fluctuations in market demand. In many industries, moreover, the very nature of the processes is such that machines are constantly going into action and out of action, even when the volume of business is entirely normal. The central electric station stands ready to furnish power in just the quantities required.

Electricity in the Home

Two out of three families in the United States now use electric current in their homes. In 1907 the proportion was one out of ten or more. Central stations sell about thirteen times as much for domestic purposes (including current for the lighting of streets, stores, offices, etc.) as twenty-five years ago. Moreover, a given quantity of electric current furnishes far more light than formerly. The use of tungsten filaments and other improvements in lamps have more than doubled the ratio of candle power to the number of watts consumed. The competition of electricity has likewise stimulated advance in the methods of lighting by oil and gas, so that every family, rural as well as urban, benefits by far more light than formerly, a fact of much social as well as economic significance. Although the new illuminant has checked the increase in consumption of petroleum and gas for lighting, nevertheless these fuels have expanded greatly in the field of cooking and household heating.

The use of electric current for heat and power in homes is rapidly growing. Electric flatirons, cooking utensils, vacuum cleaners, washing machines, and sewing machines have become very common, and just lately the artificial refrigerator is coming forward strongly. The value of such equipment produced annually is roughly ten times as much as fifteen years ago. The saving of time and effort to the housewife through such devices is a very real economic and social gain.

Along with expansion in the household use of electricity has gone an equally marked increase in consumption for the lighting of other buildings and of public streets and places. Theaters and amusement parks rely on more and more brilliant display of light to attract patronage. Factories are far better lighted than formerly; abundant light not merely saves the much-abused eyes of the workers, not merely increases accuracy and speed, but, above all perhaps, approves itself by its effect on the spirit of the employees. Of all recent developments in the field of lighting, the electric advertising sign is the most conspicuous to the casual observer. Along with other intensive bombardments of the eye, highly intricate and often very beautiful devices flood city streets with the brilliance of thousands upon thousands of multicolored incandescents.

SECTION 6. LARGE-SCALE ENTERPRISE

Large-scale enterprise is to be distinguished from mass production; both are conspicuous in American industry. Mass production usually involves large-scale operation, but a good many great concerns engage relatively little in mass production, in the technical sense which implies the manufacture of vast numbers of identical units.

The United States has not only many individual industrial plants of great size but also many concerns, usually organized as corporations, which own or control several or many plants. Some of these multi-plant concerns¹ reach giant stature. There are several American corporations which have each an output greater than that of all the manufacturing industries in a good many of the countries of the world. A multi-

¹ Since the word "combination" has come to convey often the implication of restraint of trade and monopoly, the term "multi-plant concern" may in most cases be more conveniently used, without reference to the proportion of the industry controlled by such a concern or to its aims. It may be noted that many such concerns have never brought together plants formerly independent, but have themselves established the plants they own.

plant concern may comprise a number of similar plants operating in the same stage of production, or it may involve "integration" of plants operating in successive stages, or it may possess both of these features. A company may have an iron mine in Minnesota, a coal mine in West Virginia, a blast furnace and steel-works in Pennsylvania, and tube or bridge-steel works in Ohio. Several of the big concerns in the steel industry carry the integration of stages of production much further than this. Integration does not necessarily imply the existence of several plants. Even the single plant may carry on numerous quite distinct processes; indeed, in almost every factory integration appears in some degree. The typical American textile mill, for example, both spins yarn and weaves fabrics from it, whereas in Europe these processes are pretty generally separated.

No statistics exist as to the proportion of American industry carried on by multi-plant concerns. The census unit is the plant, not the controlling concern. According to the census of manufactures there were in 1919 nearly six thousand "central office concerns," each controlling two or more manufacturing plants for which it made reports of operations; the census experts put out a rough estimate that these central offices accounted for one third of all the business. There were, however, other instances in which, although a number of plants were in fact controlled by some larger organization, each of them made separate reports of their operations. The importance of multi-plant concerns is no doubt greater today than in 1919. Some hundreds of those now existing are of first-rate magnitude. Most of the industrial corporations listed on the stock exchanges are multi-plant concerns. On the other hand, many multi-plant concerns are not conspicuously large: they may be out-ranked by other concerns that have but a single plant.

A rough indication of the importance of big concerns (whether operating one or more plants) in American business may be gained from the classification of corporations according to the amount of their net income as reported for

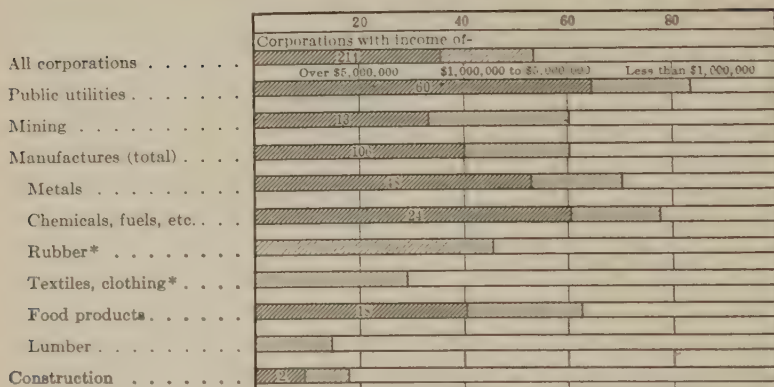
taxation (see Fig. 30, *A*). Net income, however, may be by no means proportional with the gross volume of business. The data for manufactures are particularly significant. Over 90 per cent of all factory output is produced by corporations. In 1926 more than 55,000 corporations in this branch of industry made returns, but 106 of them, each with a net income exceeding \$5,000,000, reported over two fifths of the total income.¹ The average net income of these 106 concerns was over \$17,000,000 each. The 547 corporations with an income of over \$1,000,000 each accounted for nearly 61 per cent of the total corporate income. In several of the more specific manufacturing groups the proportion of income falling to the big concerns was much higher still. In mining the ratios are not very different from those in manufactures. In transportation, as might be expected, the large corporations are much more dominant.

Census statistics classify individual manufacturing plants according to their size (see Fig. 30, *B*). The classification according to value of product, which throws into one group all plants with an output of more than \$1,000,000, scarcely shows satisfactorily the importance of the really huge establishments. However, a million-dollar output is by no means a small thing even in this modern day. In 1925, out of 187,000 manufacturing plants there were about 10,600 in the million-dollar class, and they together contributed a little over two thirds of the grand total value. A better indication of size standards is afforded by the classification based on the number of wage-earners. In 1923 (the latest data) 963 plants had as many as 1000 each. These together employed more than 2,100,000 — an average of nearly 2200 each, or almost a quarter of the total number of wage-earners in all factories. Another seventh of the workers were

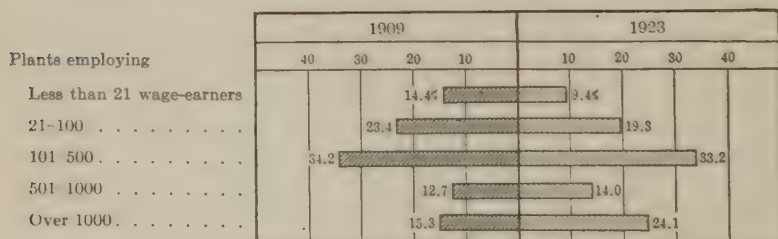
¹ That is, of the total net income of those that had any net income. If the deficits of other corporations be deducted, the proportion for the big concerns becomes much higher. Of those corporations which reported not only amount of income but also amount of assets, those with a net income exceeding \$5,000,000 each had a little over 30 per cent of the aggregate assets.

A. DISTRIBUTION OF TOTAL CORPORATE NET INCOME

PERCENTAGES OF TOTAL INCOME, 1926



B. SIZE OF MANUFACTURING PLANTS; PERCENTAGES OF WAGE-EARNERS



C. AVERAGE SIZE OF POWER-USING FACTORIES

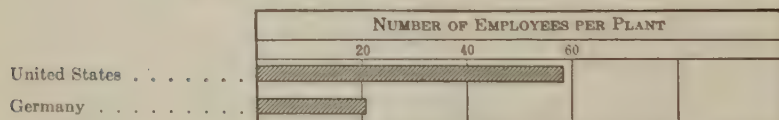


FIG. 30. Diagram showing size of business concerns and plants

Section A shows what part of the total net income of corporations (according to their tax returns for 1926) is received by corporations with incomes of specified magnitude. The figures inserted in the bars represent the number of individual corporations with income of over \$5,000,000. Section B relates to individual plants as distinguished from concerns one of which may own several or many plants. It shows that large plants had a greater proportion of the total number of wage-earners in 1923 than in 1909. The comparison of size of factories in Germany is approximate only. See text discussion on all these points. The asterisk indicates that distinction of concerns with a profit of over \$5,000,000 is not made

in plants reporting from 500 to 1000 employees. Some industries lend themselves much more to large-scale operation than do others. In the motor-vehicle industry over four fifths of the workers in 1923 were in establishments employing more than 1000 wage-earners; 34 of the plants together had almost 200,000 workers. Again, in the steel industry (rolling mills) 102 big plants together employed 252,000 wage-earners, or nearly two thirds of the entire number in that field.

Multi-plant concerns, in the true sense, are much less developed in any European country than in the United States. Even in Germany those companies which actually unite a number of plants are far fewer and smaller. The typical "cartels" in Germany and other European countries are merely agreements between concerns which retain their separate ownership and operation. These arrangements — essentially similar to the old pools and price agreements which have been banned by American law — secure little or none of the operating economies which come from the concentration of actual management. Their main purpose is to restrict competition and maintain prices.

An approximate comparison as to the average size of individual manufacturing plants may be made between the United States and Germany.¹ In the latter country in 1925 there were 414,000 manufacturing plants using mechanical power. The number of persons in them — proprietors, salaried workers, wage-earners — was approximately 8,500,000. In the United States in the same year the corresponding

¹ The German industrial census covers the smallest as well as the biggest plants, whereas that of the United States excludes those with a value of product less than \$5000 annually and also excludes custom-tailoring shops and various other businesses which fall within the scope of the German enumeration. The number of employees in plants using power is not directly reported in either country. It may be approximated by deducting from the total number those estimated to be employed in plants not using power, on the assumption that each such plant employs on an average one and one-half persons, including proprietors and firm members. The margin of error is relatively small.

figures were 168,000 plants and about 9,800,000 persons. On the average each German factory had a little over 20 workers as against nearly 60 in the average American plant. Germany, typical of the leading industrial nations of Europe, thus falls much below the United States with respect to the scale of industrial operations. In most countries of the world business is conducted on a far smaller scale. Conditions in this respect in eastern Europe, Asia, Africa, and Latin America are still for the most part similar to those that prevailed in western Europe and in the United States at the beginning of the nineteenth century, although large factories are recently springing up even in these parts of the world.

The fact that American plants and industrial concerns are larger than those elsewhere is due to several causes. Most important is the vast domestic market, the result of a great population and high buying power. Since the total production of most manufactured commodities is several or many times greater than in any other country, it is natural that the scale of the individual producing units should be large. Europe's close web of national boundaries sets barriers to wide distribution and tends to perpetuate relatively small-scale industrial operation. Again, the rapid growth of American industries is an important factor in the creation of big concerns. So too is the abundance of capital and the convenience of assembling it into the hands of corporate concerns. Moreover, foreigners themselves assert that Americans have a peculiar fondness for big things merely as such, as well as exceptional capacity for organizing and managing them.

A steady growth in the magnitude of industrial units appears throughout American history. Naturally the movement was even more rapid a century ago, when the factory was just beginning to replace the hand trades, than it is at present. The development of multi-plant concerns has, however, taken place chiefly during the past fifty years. Almost every year of the present century has witnessed the

creation of several such concerns of conspicuous magnitude, although since about 1905, by reason of the anti-trust laws and of adverse public opinion, the new concerns have seldom brought together as large a proportion of the total business in the given field as did certain of those founded earlier. Combinations have become more numerous but less monopolistic.

Census statistics as to the size of individual manufacturing plants go back as far as 1904. In that year plants with an output valued at \$1,000,000 or more together accounted for 38 per cent of the total value of product. The corresponding proportion in 1925 was 67.6 per cent. The comparison is not altogether just, because the advance in prices has brought up into the million-dollar class plants that otherwise would have remained below. Had prices stood unchanged, about three fifths of the value of output would in 1925 have been produced by million-dollar concerns. The measurement of the size of factories by number of workers employed escapes the difficulty mentioned. In 1909 there were 540 plants with over one thousand wage-earners each; 963 were reported in 1923. Such plants had about one seventh of all factory workers in the earlier year and one fourth in the later year (see Fig. 30, *B*).

There are, to be sure, in the United States many factories of medium or small size. Some of these are "left-overs" destined gradually to disappear. However, in certain manufacturing industries, just as in agriculture, the nature of the work to be done is such that big plants have little or no advantage over those of medium size. Large production units are usually most advantageous either where massive machinery and equipment are needed to secure the lowest costs, or where the product made is of a complex character and at the same time is demanded in great numbers of units. A large and increasing proportion of American manufacturing industries make such complex articles; for example, the automobile industry. Large-scale operation here finds its greatest advantage in the high specialization of machinery

and of the tasks of the workers. In a small machine-shop, for example, each lathe or planer or drill must be turned now to one job, now to another. There is loss of time in the shift. To none of the tasks is the machine specially adapted ; hence it must be constantly guided by the mechanic. In the big shop there is a multiplicity of such machine tools, of different sizes, each specially constructed to perform a particular process. Each can operate with little or no interruption ; each can be made largely automatic. So, too, the large plant can maintain a proper balance in its equipment and its personnel. It can install many machines to do one job, a few to do a smaller task, one only to do a minor piece of work, and all can thus be kept busy. The number of the several classes of workers can be similarly adjusted to the needs.

Again, to be efficient an industry making complex products for a wide market must have an elaborate administrative organization, intricate cost-accounting, a specialized staff for research and invention, and a special force to keep machinery in order and perhaps to build machines peculiarly adapted to the needs of the concern. An extensive selling system, often involving nation-wide advertising, may be essential to success. Only a large unit can meet such needs well and at a reasonable cost.

The advantages accruing from the large size of plants are often accentuated in the multi-plant concerns. By the grouping of plants the specialization of equipment, labor, and expert service can be carried further and capital made more abundant. Whether overhead costs can be spread out more thinly over output by such a concern is more doubtful. Many of the big corporations have a huge overhead bill. To judge such a question fairly, however, one would have to analyze in great detail the actual results, in respect to general costs, volume of sales, and other aspects of business, achieved by such overhead expenditure. The multi-plant concern often presents still other advantages peculiar to itself. Geographic circumstances may be such that effective

integration demands an association of widely separated production units. The concern which operates a number of similar plants often gains by the rivalry between the managers of its constituent plants. It can conduct experiments with new methods or a new type of product at one plant without disrupting its whole business. Freight charges can often be cut down by the possession of plants near to different sources of material or near to different markets for products.

Apart from any question of possible monopoly or of undue concentration of economic power, fear has many times been voiced lest huge organizations, especially those of the corporate type, should kill individual initiative. How, it is asked, can we dispense with the zeal, the pride, the anxiety to escape disaster that actuate the individual owner of the smaller enterprise? If all but a very few at the top are mere cogs in a vast mechanism, how can they find life interesting? how feel incentive to put forth their best efforts?

Experience shows that these apprehensions are often exaggerated. Many a manager of a department in a great concern has a larger and more interesting task than the head of the average independent enterprise of earlier days. Certainly he often works harder. He may be imbued with high pride in the sheer bigness of the organization of which he is a part. Success in his job means advance in salary and, very possibly, promotion in rank. Moreover, he wishes to make a good showing in the eyes of his fellow managers — heads of similar departments of other concerns or of other departments of the same concern. If he is an engineer or a chemist or a technical specialist of any sort, professional pride counts heavily. It is a significant fact that rapid technical advance has been made in many industries in which all the business or the great bulk of it has long been in the hands of a limited number of very large "soulless corporations."

Although there may be some social and psychological losses resulting from big-scale business, the economic gains appear to outweigh them. There can be no doubt, however,

that the process of transition to bigger units has involved hardship to many individuals. The man who formerly managed an independent enterprise is not necessarily the one who becomes the manager of a department in the larger enterprise: not infrequently he is driven to the wall and has to accept an inferior position in the world of affairs. Here, as in so many other directions, progress brings growing pains.

SECTION 7. MASS PRODUCTION, STANDARDIZATION, AND SIMPLIFIED PRACTICE

No small part of the efficiency of American industry grows out of the widespread practice of producing, where the nature of things will permit, great numbers of identical or closely similar units. This so-called "mass" or "repetitive" production has been developed to a degree unparalleled elsewhere. Thousands of plants practice it. A single plant may turn out thousands, tens of thousands, even millions of standardized articles. Obviously this multiplication means a great lowering of unit costs.

An automobile factory makes during a given year only a limited number of models materially differing from one another even as regards the body of the car, and the number of its distinct chassis designs is smaller still — perhaps only three or four. Yet a plant may turn out cars by tens or hundreds of thousands. Though most makers, under stress of competition, get out new models each year, a large proportion of the parts often remain unchanged for much longer periods. The Ford motor car is an extreme case both of immense output and of long continuance of basic features. Of the major Ford parts millions upon millions were made quite identical over a series of years until the complete change of model in 1927.

Many other familiar articles — some elaborate and costly, others simple and cheap — are similarly produced in mass fashion. Typewriters, adding machines, and cash registers; electric bulbs, fixtures, accessories, and apparatus of many

kinds; railway cars, small gas engines, furnaces, radiators, gas stoves, bathtubs, agricultural implements, household utensils, safety razors, toilet articles and preparations, are among the items of a very long list. Many kinds of mining, factory, and transportation machinery are highly specialized, only a few units (perhaps a single unit) of a given type being produced; but there are also many types of widespread use turned out in great numbers of identical units.

Mass methods appear conspicuously not only in manufacturing industry but also in construction. Thousands of miles of improved highways substantially alike have been built during recent years. Towering office buildings pile identical story on story. A dozen, a score, a hundred houses are erected by a builder on a single fundamental plan. Factory buildings multiply sections and stories of similar design. Even where buildings differ radically in form, size, and style, they usually contain many standardized parts, such as windows, doors, plumbing, and the like.

Foreigners who hear much of mass production in the United States sometimes get the impression that it results in a monotony such that not even the abundance of the possessions of the people can make their life other than dreary and uninspiring. They fancy individual preference submerged in one vast sameness. This is far from being a true picture. For the most part multiplication of identical units is practiced in the case of things where either variety would possess little if any advantage or the fundamental identity can be cloaked in superficial variety that gives play to individual tastes. Nickel and paint and upholstery make the basically standardized American motor car diverse enough in outward aspect to please the most fastidious. The American manufacturer, whatever his field, is keen to get out new styles if there be demand for them; he will dragoon the public into accepting the novel thing if he can. Indeed, nowhere else in the world is there offered such bewildering variety of garments or of articles of personal adornment. The houses built during recent years are often only too lacking in simi-

larity ; even a row built from a single basic design may be dressed up till it superficially resembles a comparative international exhibit of architecture, with jazz added for full measure. Whatever the quality of American taste, it certainly is not smothered under mass production.

Standardization of product in most cases reaps the richest harvest of economy where it goes hand in hand with large-scale business. In the case of simple articles, to be sure, a concern of moderate size may turn out large numbers of units. If the product is intricate, extensive repetition demands a big plant to make large numbers of the many parts. Such a plant can, as has already been pointed out, install highly specialized machinery to perform each task. In the huge automobile works of the United States the efficiency of mass production has reached such a pitch that, despite much higher wages than are paid in western Europe, American motor cars sell much below those of similar quality made in Germany or England or France or Italy.

In many fields the European manufacturer can scarcely hope to rival the American in the economies of mass production because the great population and high buying power of the United States spell demand for several times as many units as could possibly be sold in any other single country, and because tariff and trade barriers go far to prevent the European plant from selling much outside the boundaries of its own country. Moreover, inasmuch as the magnitude of the American domestic market reduces unit costs, the American manufacturer has often an advantage in selling in foreign markets ; he can scale the tariff wall that is too high for his European competitor, or can even, over such a wall, undersell foreign manufacturers in their own country. The big home market is a major factor in the success of the American exporter.

Apart from the lowering of prices the consumer gets other advantages from mass production of standardized articles. He can usually rely on their quality. He knows what he is getting because many of his neighbors or his business associ-

ates are using the same thing. The manufacturer can usually maintain large output over any long period only if his product is of uniform excellence in materials and workmanship. It is a further advantage to the consumer that articles produced in mass fashion are easily accessible. If he wants to examine a particular make of automobile or of typewriter or of radio apparatus, he does not have to seek it out in some distant town. There are agencies and dealers almost everywhere. Particularly important is the convenience and cheapness with which interchangeable parts and repair work for a standardized article can be secured.

In the case of most of the more complex types of manufactured articles mass production is the result merely of a large output on the part of the individual concern. Different concerns do not ordinarily make articles of this sort alike. Their competitive appeal is not as to price alone but as to design, attractiveness, durability, and other features. But there are many commodities of simpler type where the purchaser has little or no reason for preference, where all he wants is reliability and the lowest price possible. This is the case with brick, lumber, shingles, window glass, sheets of metal, many classes of hardware, the simpler kinds of household utensils, dishes, and glassware, and scores of other similar things. Here standardization can go much further than with more complex articles or than with those which appeal to taste or fashion. It may extend beyond the individual concern and embrace an industry.

Formerly most commodities of this character were made in a wholly unnecessary, wasteful, and actually inconvenient variety of shapes, sizes, thicknesses, and other characteristics. Whether by force of tradition or by reason of fancied superiorities or of supposed advantages in competition, the manufacturer either tried to make his "line" a little different from that of the other, or, on the other hand, he multiplied the variety of his output with a view to being able to supply the same thing as this or that competitor. These practices not merely threw a heavy burden of production and selling

costs on the producer: they were inconvenient and expensive for the middleman as well. He had to carry excessively varied stocks. He often missed a sale because he did not happen to have just what the finicky customer fancied he wanted. Moreover, the needless variety was of very distinct disadvantage to the final consumer. It bewildered him, it wasted his time, and it made matching difficult or impossible.

Here was an obvious call for concerted action. "Simplified practice," opening the door to the full economies of mass production, could not be attained in articles of this type without consultation and agreement among producers, dealers, and large consumers. It was a question of combination not in restraint of trade but in liberation of trade. Competition in price and quality could be all the more effective if the buyer were in a position to give his attention to these and not to unimportant physical differences in size, shape, or superficial appearance.

A great deal has been accomplished by such group action in recent years. The United States Department of Commerce has played an important part in bringing about simplified practice. It has not sought to dictate, nor in most cases even to suggest, what unnecessary varieties of goods shall be eliminated. It has called attention of one trade after another to the wastefulness of its methods, and has formed a meeting place and a clearing house of information for the interests concerned. At the close of 1928 the department's Division of Simplified Practice reported that since 1921 about ninety plans for standardization had been adopted under its auspices and that these had been adhered to by nearly 1100 trade associations and more than 13,000 individual concerns. In 1926, for example, an agreement was reached among manufacturers of vitreous-china plumbing fixtures (bathtubs, toilets, washbowls, etc.) whereby the number of styles and sizes was reduced from four hundred and forty-one to fifty-eight. Another provided for standardization of the veneer stock used in making wire-bound boxes. The number of thicknesses of stock was reduced

from nine to four, the number of widths from sixty-five to five, and the number of lengths from one hundred and two to six. How greatly changes of this character must lessen costs is apparent. Estimates of the aggregate annual savings brought about by recent agreements for simplification of products run into hundreds of millions of dollars.

SECTION 8. SYSTEM : THE REASONED CONDUCT OF BUSINESS

Much of what has been said already in this chapter regarding methods of American industry indicates that there must be on the part of managers and technicians a conspicuous striving for System with a big *S*, a marked application of reason to business. The large use of capital, big-scale operation, mass production, and standardization all imply systematic organization and management. American business men have no monopoly of intelligence or of zeal; but there is reason to believe that, as foreigners themselves commonly assert, they are less bound by tradition, that they go less by rule of thumb than their fellows in most other countries. This is largely because of the rapid expansion of business resulting from the growth of population and the opening up of new resources. With constantly new work to do, resort to new methods is natural.

System in General Administration

Not a few American industrial corporations compare with a large city, even with a fair-sized country, in the magnitude and diversity of their functions. They number their employees by tens or hundreds of thousands; they handle as many millions of dollars. For such a concern problems of general management — of organization, of financing, of broad production and sales policy, of public relations — are of a high order of difficulty. Even in many smaller enterprises the complexity of the processes and products, the diverse situations and tendencies in far-flung markets, and

the bewildering influences of competition or of changes in fashion make management a task far from simple. Without system success would be impossible.

The staff of the typical American business organization is systematically arranged with a view to proper division of work and definite location of responsibility. The owner, the board of directors, the president of the corporation, no longer try to run everything. They establish clearly defined departments and divisions. An organization chart sets forth precisely the distribution of functions and the relations of the several units. A specialist is put in charge of each field; salaries are high enough to get first-class talent. Although individuals are held responsible for carrying out policies, the framing of policies is often a task for committees.

The staff thus systematically organized is in a position to attack the problems of management systematically. Decisions are not left to intuition, to snap judgment. Information is assembled in orderly fashion. Reports are prepared of results accomplished, of conditions existing, and of plans proposed. Elaborate statistics and accounts are maintained. Everything is set down, from the stock of the smallest material to the cost of the most detailed process, the sales in the most remote market. All these data are scrutinized by individual executives and directing committees with painstaking care; they are made the basis both for "jacking up" work and for forming policies. So, too, systematic analysis is made of those conditions outside the concern's own organization which may in any way affect the supply or the prices of materials, the demand for products in general and in particular markets, or any other aspect of the business. Certain members of the staff are charged with considering the problems of longer range and with laying the foundations for broad future policies of expansion or of changes in plant, processes, or product. Often the concern finds it expedient to employ a permanent legal staff to make its contracts, to see to its property rights, and to protect its interests generally.

An important contribution to the recent prosperity of the United States has been the increased collection and use of general statistics of business. Partly through government and partly through trade associations, trade journals, and private research organizations, a great mass of data has been made available. Statistics assembled by private effort are for the most part published to the world so that all interested may profit by them, and of course this is true of all government statistics. As to major products of agriculture, mining, and manufacture, data of output and prices and stocks are secured month by month or even week by week. Statistics still more detailed, and statistics as to more numerous commodities, are collected annually or at frequent intervals. A biennial Federal census covers the whole field of manufacturing industry ; one every five years does the same for agriculture.

Business men in earlier years often looked askance at statistics. Many regarded the government schedule, or the government agent seeking information, as a nuisance inflicted for some inscrutable end, and to be evaded if possible. Nowadays it is the leaders of business themselves who insist upon ever wider, more detailed, and more accurate statistical returns. They study them with care ; they employ specialists to dig out of them the less obvious causal relations and trends. More and more are business campaigns planned in the light of such statistical material. There have sprung up a number of private profit-seeking organizations of statistical research which are largely patronized by business concerns. They lay special stress on "business barometers," on the correlation of various time-series of phenomena, on the data which have a bearing on the "business cycle" ; some undertake the perils of forecasting general trends or trends in particular lines of industry and commerce.

No other country approaches the United States in the scope, accuracy, or promptness of industrial and commercial statistics. For the most part business men abroad have not as yet come to appreciate their practical utility ; and governments, especially since the impoverishment following the

World War, have been loath to spend liberally in the collecting of data. The movement is growing, however, and American practice is very generally held up as the pattern.

The growing recognition of the importance of efficiency in business administration has led American colleges and universities to devote much attention to the subject. Courses in economics, theoretical and applied, in commercial geography, and in other similar topics have been multiplied; their students number scores of thousands. In a few institutions highly specialized and intensive studies in the more advanced aspects of business organization and administration are conducted. The case system is used much as in the best schools of law. There are several journals and many textbooks in this field — some popular, some of a very technical character.

System in Production

Not only in the broader aspects of administration but in the more specific conduct of current production, American business is characterized by insistence on system. Methods are carefully worked out for saving materials, energy, and time of men and equipment, and for preventing defects in output. Often the industrial concern seeks the temporary service of "industrial engineers" outside its own organization; in other cases specialists are employed permanently to devote themselves exclusively to systematizing production. Upon all employees in authority, high or low, is impressed the importance of watching for leaks and of initiating better ways of doing things.

As regards waste of materials, prevailing American practice is hardly yet on a par with that in western Europe. The abundance and cheapness of most raw commodities has tended to breed extravagance. However, in recent years marked improvement has taken place, accelerated by advance in the cost of many materials, both domestic and foreign, as compared with prewar levels. Greater efforts

have been made to utilize materials to the best advantage in the primary products themselves and to find profitable uses for the wastes and by-products. The chemist and the physicist have played a large part in this movement; the production manager and the sales manager have also done their bit.

Recent progress in saving materials is conspicuously illustrated in the wood industries, formerly a classic example of American wastefulness. Science is finding means to make many valuable products out of slabs, sawdust, and other left-overs of the mills. Charcoal, chemicals of various sorts, paper, compressed boards, and artificial silk are among these. The incinerator, whose fiery maw once devoured millions of tons of wood, has virtually disappeared. Just now plans are under way for the saving of the wood from which tanning materials have been extracted. At the same time economies are being sought in the methods of sawing logs and marketing lumber. Dealers and consumers are being urged to use the less perfect forms of lumber — the short lengths or those which have a certain number of knots and other defects — for the many purposes for which these are fully satisfactory. A National Wood Utilization Committee has been organized comprising manufacturers, dealers, and large consumers, and working under the auspices of the Department of Commerce. It is bending its effort to discover and inculcate ways of checking waste of this valuable material.

Another means of lowering production costs, much practiced of late, is by bettering the physical arrangement of factories, in order to eliminate needless movement of things and persons. Machines performing successive processes are placed in juxtaposition in a progressive series. Stockrooms with materials and tools are placed close to the machines and men using them. In many cases basic materials are at the outset carried by mechanical conveyors to the top story of the factory, whence they proceed downward with the aid of gravity through successive stages of advancement till the completed goods are ready for shipment from the ground floor. Special effort is made to cut down human labor

in moving things. Ingenious conveyors are installed — moving platforms, endless belts, overhead trolleys, and other devices. In some instances workers perform successive operations on a product while it continues in motion.

The adoption of these methods of economy is, of course, promoted by the large scale on which industry is commonly conducted and by the abundance of capital. Of special importance too is the rapid growth of industries. Because output is expanding, new factories and extensions can take advantage of the newest devices, the installation of which in an old plant might be prohibitively expensive.

System in Labor Management

American mines and factories have done much in systematizing and standardizing the work of the individual operative or mechanic. To an extent scarcely paralleled elsewhere they practice so-called "scientific management" in the selection, promotion, and direction of labor.

Often the application of system begins with the selection of employees through an expert "personnel officer" and staff. The experience and education of the applicant are investigated; physical and psychological tests are given to determine his strength, his quickness, his grasp and judgment, and the fitness of his mind and body for different kinds of work. The aim is to get the right man in the right place. Once a worker is on the roll, careful records of his efficiency are kept. Promotion depends on these and, where necessary, on further psychological and practical tests. The employee found unsuited to one job is given a chance at some other. In many cases the workers are given special instruction in their jobs. Formal apprenticeship is not common in America, but systematic effort to train employees and develop their capacities is common enough.

Methods of pay are very frequently arranged with a view to stimulating the worker to do his best. Piecework and premiums for output above a given stint are practices prob-

ably more widespread than in most other countries — certainly more than in England. Labor organizations both in America and abroad often oppose these methods of compensation, but in the United States such opposition is less manifest now than formerly. The attitude of labor in England toward them is largely influenced by the opinion, already mentioned, that there is not enough work to go round — an opinion which has much less foundation in the United States. American employers have pretty generally learned the folly of using piece-pay and similar methods of compensation to the injury of the workers by cutting down rates when the few fastest workers are found to be earning big pay.

Most important of all methods for promoting efficiency of labor is the systematic analysis of jobs and the laying down of such procedure as will minimize time and exertion. The most elaborate embodiment of this policy is the system of shop management devised by the late Frederick Taylor. Many concerns undertake to determine, by expert investigation, the exact procedure that will give the best results, and to fix a minimum output to be expected from workers under the procedure. In some cases compensation is so arranged that, if a worker produces more, he is not merely paid for the extra output but paid at a higher rate per unit — this on the ground that the employer gains by more complete utilization of his plant and machinery. The former opposition of certain workers to such methods has virtually disappeared as managers have learned to apply them wisely and fairly.

Methods of work are left to tradition or to whim far less than formerly. Results from different methods of handling jobs are recorded and analyzed. Workers are watched not merely to keep them from "soldiering" but still more to keep them from doing things the wrong way. At the same time the best American practice aims to make the rank and file of the operatives use their minds in their work; brain guidance of the job is not considered something incumbent on the bosses alone.

Scientific and Technical Work

System appears conspicuously in the more technical aspects of American industry. Inventions of machinery and discoveries of products and processes are in these days seldom matters of hit-or-miss. They are only in a small part the achievement of persons working independently. The romantic figure of the lone inventor in his attic has pretty much disappeared. Technical research has become organized — coöperative. Copying in some measure the German example, American industry has in many fields gone even further: the abundance of capital and the ever expanding markets have given it decided advantages in systematizing invention and discovery. Reference has already been made to the bearing upon industrial progress of the work in pure and applied science in the higher educational institutions. Perhaps even more important, from the utilitarian standpoint, is the research work conducted by industrial concerns.

Every important manufacturing or mining corporation maintains an expert technical staff: engineers, physicists, chemists, biologists. It has experimental shops and laboratories, often with extraordinarily complete equipment. Some of the work done is of a more or less routine character. Current materials and products of the plant are subjected to standard tests to determine their quality. The products of competitors likewise may be examined. In many industries, especially those involving chemical processes, the services of the technician are in constant evidence throughout the productive processes. Very often, however, industrial engineers and scientific staffs carry their researches into far higher realms. It is theirs to carry forward the torch, to invent, to discover.

At the present time new and improved machinery is for the most part devised in laboratories and shops of the manufacturers or users of the machines. Their experts, standing close to the actual work of industry, are peculiarly able to determine where need lies, whether for minor improvements or for radically new inventions. Once the need is recognized

it is usually merely a matter of systematic application of brains, experience, and money to find a way to meet it. The presence of ready means of testing new devices in actual operation is a great advantage.

Similar are the methods in physical and chemical research. The rapid and manifold development in the electrical field is largely the result of scientific work undertaken by business concerns. Organic chemistry in the laboratories of manufacturers has yielded a multitude of new and valuable products and has found new and cheaper ways to produce those already familiar. Some of the great business concerns encourage their technical staff to conduct highly abstract researches, the value of which from the standpoint of dollars and cents may be altogether problematic. They do this partly in the spirit of public service, partly as a form of advertising, and partly because they recognize that every now and then some new principle of science thus disclosed may prove of high practical utility. Not a few world leaders in science are in the employ of American industrial concerns.

System in Selling and Advertising

Great attention is paid in the United States to methods of pushing sales. It is recognized that the finding and building up of markets has often as much to do with success as efficiency in production. The lowering of costs resulting from expansion of outlets is a powerful incentive. Salesmanship and advertising have become highly specialized arts. They are taught in public schools, in colleges and universities, and by correspondence schools. Business concerns often give intensive training to their employees in methods of selling goods. There are many books and periodicals dealing with the subject.

American manufacturers and dealers very commonly organize their selling staff and systematize their selling methods in most thorough fashion. Organization and methods vary, of course, with the nature of the product and the character of the customers whose patronage is sought. Studies are

made of the buying power of the various classes of the population, and of sections and communities. Information is sought in every honorable way (and there have been some instances when means used could scarcely be characterized by that adjective) as to the sales of competitors. Elaborate records of the sales of the concern itself are kept. Careful analysis of all these data furnishes a basis for the planning of sales campaigns. Quotas are set as to the proper volume of sales, and strong pressure is put on employees to reach these quotas.

Advertising in America has become immense in volume, extraordinarily varied in method, and often remarkably skillful and attractive in its appeal. Enormous sums are spent upon it, probably from two and one-half billions to three billions annually. A page advertisement in a single issue of a popular periodical may cost hundreds or even thousands of dollars. The total receipts of all periodicals from advertising are about one billion dollars annually. Vast numbers of pamphlets, circulars, and letters are sent through the mails. The increase in the receipts of the United States Post Office from twenty-seven cents per capita of the population in 1860 to nearly six dollars at the present time is in large part a reflection of the growth of advertising in periodicals and in other forms. Airplanes trace in the sky gleaming trails proclaiming the merits of this or that article. Huge signboards rise along railroads and main highways. In the street car or bus "ads" stare the patron in the face. Myriad lights blaze their winning sales-messages along the Great White Way and its many replicas in smaller cities. Striking slogans are coined to catch the eye and rivet the mind. The aim is to make the name and claim of the advertiser as familiar as the rising of the sun or the breath of the breeze.

All this advertising is systematically conducted. Results are tested in every possible manner; methods found effective are expanded, others are abandoned. Large concerns often maintain highly paid advertising experts; in other cases they employ one or another of the specialized advertising agencies that have grown up. These have large staffs of

artists, writers, statisticians, and accountants to prepare attractive and convincing advertisements, to study markets, and to analyze the results obtained by different mediums and methods of advertising.

The only countries that even distantly approach the United States in advertising effort are England and her dominions. More is spent probably on advertising in the United States than in all the rest of the world put together. Two or three of the American metropolitan dailies together very likely carry more advertising (taking into consideration the number of copies sold) than all the newspapers of Germany or of France. The explanation lies chiefly in the fact that the large population and the high average family income in America make the number to whom the advertiser can appeal so much greater than elsewhere; in part it is found in tradition.

Not all this intense sales effort serves to reduce the cost of products to the consumers. By building up the volume of output, it often cuts down production cost per unit materially; but in some cases this saving is more than counterbalanced by the expenditure for selling and advertising itself, which ultimately comes out of the consumer's pocket. Although heavily advertised products are usually of good quality they are not always cheap. Uneconomical advertising is, however, apparently the exception rather than the rule. In many if not most cases the intensity with which American business pushes sales makes for the prosperity and progress of the country and for the well-being of consumers as well as producers.

SECTION 9. THE COMBINATION OF INDIVIDUAL INITIATIVE AND COLLECTIVE ACTION

Those factors making for progress which we have been discussing are of a character readily to be described, and some of them even may be measured. Their economic influence is more or less obvious. There are, however, other

factors which count much for economic efficiency but which are woven so intimately into the fabric of American life that only with difficulty can one trace their part in determining the pattern. We must pass over most of these with mere mention. Thus in the political and legal field important economic effects flow not only from the democratic form of government (an institution shared by many other countries) but also from the division of function among the several grades of government, the constitutional limitations upon the action of legislative bodies and administrative officers, and the independence of the courts in upholding these limitations — aspects by no means common elsewhere. The equality of every citizen before the law, although not always perfectly maintained in practice, is a major factor in the economic life of the country. Another very important influence for the prosperity of business in America is the system of currency, banking, and credit. Its stability has contrasted strikingly with the widespread financial debacle in war-torn Europe and with the insecurity which has often appeared even in countries free from the strain of conflict.

Various psychological and social attitudes and conditions must likewise be merely listed without discussion. The working of the pioneer environment in the early molding of the national character has been alluded to in an earlier chapter. Much might be said regarding the economic bearings of the moral standards prevailing among the people, and especially of the standards of business ethics. Even American religious opinions and practices have their influence on business; so also do the relationships between social classes in the community, between races and nationalities, between the native stock and the foreign stock, between the rich and those of smaller means, between the townsman and the dweller on the soil. Broadly speaking, demarcation along such lines is less sharp in the United States than in most other countries. There is exceptional freedom from caste and from class conflict. This social condition both adds to productive capacity and expands the demand for goods.

One trait of the American character is often held up, both at home and abroad, as the greatest single influence contributing to economic progress. This is the spirit of individual initiative. The significance of that trait, however, cannot be properly understood without grasping the fact that Americans are at the same time prone to collective action where that is indicated by the nature of the task to be accomplished. They work well in groups. Usually, and by preference, these groups are private, not governmental.

Some critics maintain that the typical American is, as a matter of fact, anything but an individualist in most aspects of life; that his "consciousness of kind" is too strong; that he thinks and acts for himself all too little in matters æsthetic, philosophic, ethical, and social. However this may be, there are few who question that in economic affairs the individual in the United States demands and possesses a degree of freedom from interference (at any rate interference from the government) such as is found in few other lands. The springs of this liberty are varied. There is the inheritance of institutions and laws from England, leader among European nations in the practical recognition of personal rights. The political philosophy that flowered in western Europe during the century preceding the adoption of the American Constitution (one fruit of which philosophy was the French revolution) exercised much influence. So too did the economic philosophy of Adam Smith and other great thinkers of the same period, who taught that the wealth of the nation is the sum of the wealths of its citizens; that the individual seeking his own gain must almost of necessity contribute to the gain of society. These seeds found in the newness of America and in its vast open spaces a peculiar advantage. They could not be choked by the tares of "divine right of kings," of tradition and caste, of vested rights on the part of the few to limit the free action of others. The longing for freedom to manage one's own business, which had always lain in the hearts and minds of men, found in virgin America expression largely denied it in history-chained Europe.

The Federal Constitution of the United States was one of the first great documents of the world to set up broad and strong bulwarks for individual rights. It limited the powers of government, both national and state, and proclaimed freedom for each citizen — provided at least he were white — against encroachment by others under the cloak of law. The constitutions of the several states, later adopted or revised, were for the most part conceived in the same spirit. And although constitutions in themselves may become dead words, the attitude and will of the American people made these provisions living things.

There is in the United States exceptional breadth and liberty as regards rights of property and contract: to get what one can by his own effort, to do with it what he will, and to agree with others, equally free, as to joint action and mutual obligation. A conspicuous illustration is found in the general incorporation laws, found in practically every state, allowing these "artificial persons" to be set up, for almost any purpose and with very wide powers, without separate legislative or administrative authorization from the state. Governments — national, state, and local — for the most part confine to the minimum their interference with business, regulating only where the exercise of undue freedom by the one hinders the freedom of others or works them injury. Of great importance is the fact that governments rarely undertake to perform services that can be performed at all satisfactorily by private individuals or concerns. Even most services that are "affected with a public interest," such as the operation of railways or power plants, are almost altogether left to private enterprise; for the safeguarding of that interest the people rely on regulation by statute, by commissions, or by the courts. A striking instance of self-abnegation of government (though at the same time it made for the ultimate strengthening of government) was the bestowal upon individual citizens, either gratis or for a nominal price, of the vast area of land that at the outset was public domain.

No doubt the policy of *laissez faire* has in some respects been carried too far in the United States. The people are learning that, with the multiplication of their numbers and the piling up of their wealth, there arise ever closer and more intricate relations which may make necessary greater public control of individual action and greater direct governmental service. But in the past too little government has done far less harm than too much government would have wrought. However much the country may find it necessary to lengthen the arm of the state, there is no prospect that it will go over to a policy of intrusting to it any great part of the conduct of economic affairs.

Because government in the United States has not arrogated too much to itself, the individual citizen has felt to the full the stimulus of the opportunities of a rich new continent. He has become bold to embark upon enterprises which in many countries are held too vast for any but the state. But his individualism, strong against state interference, has not blinded him to the necessity of coöperating with his fellows in big tasks. Great business undertakings in America are rarely the work of any single person. They usually represent collective but private effort. One man may perhaps conceive the plan. One may be the leader. But in most instances he draws to himself lieutenants of high capacity — men who are willing to subordinate their individualism to the common job, who loyally follow and support the chief. Often, moreover, the enterprise is from the outset controlled by a group of individuals equal in authority. Whatever the situation regarding the personnel, the great majority of large industrial and commercial units make use of the joint capital of a number (often a very large number) of persons. The typical big business is of corporate form.

Indeed, private collective action in the United States goes so far that there are, as we have seen, critics who maintain that individual initiative is being stifled; that although it has successfully resisted encroachment by government, it is falling captive to private dictatorship. It is urged that

actual economic liberty, as distinguished from technical legal liberty, is becoming the privilege of the few, who possess it in vast — too vast — measure, whereas for the multitude there is little choice but to hire themselves and their savings out to the captains of industry. But one may suggest in rebuttal that even the subordinate in the big corporation has often a very large measure of initiative as well as a liberal monetary compensation; that the road to higher positions of management lies open to the man of capacity; that the control of great enterprises is by no means a hereditary privilege, often not even a very enduring one; and that the investor has at least the choice among many placements for his funds. Within the typical American collective group itself there is a very real form of competition. The corporation is quite different from the communistic society. Each member does not receive the same share of the income. Employees are paid according to what they do; they compete for jobs and promotion with other employees of the corporation and with employees of other corporations. Each worker, whether with hand or with brain, has the desire and, in large measure, the opportunity to rise. There is neither a deadening equality among the participants in the common enterprise nor a rigid hierarchy, equally deadening. Stockholders too are paid according to the amount of their investment; there is incentive for each to save and thereby add to his share of the profits.

Viewing these complex conditions and trends broadly, one seems justified in maintaining that individual initiative does in fact play an immense part in American economic life. Under the pressure of the need for big things, however, this individualism resorts to voluntary coöperation. Private coöperative group action largely replaces isolated individual effort, but competition remains strong among the coöperators. Instead of eleven men, each delivering mighty kicks to his own ball, we have the team. And the government largely keeps hands off. The team, not the referee, plays the game.

CHAPTER VI

OCCUPATIONS AND BRANCHES OF INDUSTRY

SECTION 1. INTRODUCTION

Thus far we have dealt only with the general aspects of the economic life of the United States: with income, standards of living, the broad history of economic progress, and the causal factors that go to explain the high well-being and rapid advance of the country. We now proceed to a more specific consideration of the industries and activities of the people. The present chapter deals with the relative importance and interrelations of the great groups of occupations and branches of production, and the chapters that follow take up these branches separately.

It has already been shown that the American people consume and enjoy in exceptionally large measure goods and services that minister to the less necessary wants, the more advanced desires; in other words, they maintain high standards of living. But high standards of consumption, at least as regards movable commodities, do not necessarily carry with them advanced and varied production. A country may import many of the more elaborate goods, paying for them with the surplus of an exceptionally large output of agricultural, mineral, or simply manufactured articles. Such, substantially, is the situation of Canada, Australia, and New Zealand. Conversely, a country may possess highly elaborative industries without a correspondingly high standard of living. Its advanced products may largely go out of its boundaries to pay for the necessities which cannot be produced at home. Such is, in a certain measure, the position of western Europe.

For the United States, however, national production and national consumption run closely parallel. The country is

in large measure self-sufficing. It produces most of what it consumes and consumes most of what it produces. Exports and imports are large in absolute volume but relatively small compared with domestic production. Providing the great bulk of the consumption of an exceptionally rich people, American industry is characterized by wide variety and by great development of those branches which supply less necessary goods and services: luxuries, semi-luxuries, and capital equipment for further increase of production.

A complete picture of the national economy would begin with the value of each class of goods and services making up the total production. It would explain these values by setting forth the number and degree of skill of the persons engaged in each branch, together with the quantity and value of the natural resources and the man-created capital used to aid these workers. But many of the colors necessary to paint such a master canvas are lacking even in a country so given to mass production of statistics as is the United States. Even the figures for value of goods and services are far from complete. Statistics are available for the output of most physical commodities and for transport and communication services, but not for mercantile, professional, governmental, and so-called personal and domestic services. Still less adequate are the statistical data regarding the value of capital and resources used in production.

This chapter deals first with statistics of occupations and, secondly, with the value of output of those of the great branches of economic activity for which adequate data are available.

SECTION 2. OCCUPATIONS OF THE PEOPLE

America's economic activities are widely diversified and nicely balanced. Each of the main occupational classes includes millions of persons. The distribution is decidedly different from that in most other countries, where commonly either agriculture or manufactures has a big lead over all

other branches. Fig. 31 makes this difference clear. The manufactures group, as presented in this diagram, includes handicraftsmen working in their homes or in small shops not commonly designated as factories, together with building workers and workers in mines. Fig. 32 shows the occupational groups for the United States in greater detail.

Agriculture and Related Industries

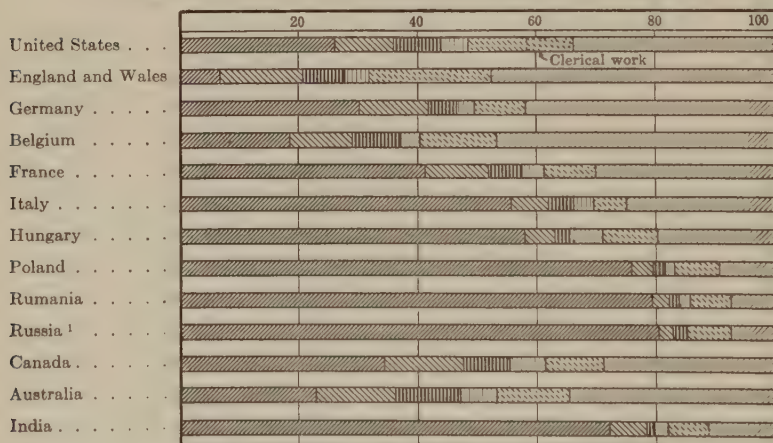
Tillers of the land make up the great bulk of the population in many of the thickly peopled countries of the Old World, where (at least at their present stage of efficiency in agriculture) little labor can be spared from the soil to provide more advanced commodities and services. The proportion for the agricultural group (which includes a limited number engaged in forestry, fishing, and hunting) rises to three fourths or more in such countries as Poland, Rumania, and Russia. For quite the opposite reason agriculture is also the chief industry in certain of the most newly settled countries, such as Canada. In the vast spaces of Argentina and Australia the pastoral industry requires relatively few people, although the value produced is large; these countries are not so highly industrialized as the occupation data suggest.

In the United States, which is neither overpopulated nor underpopulated, agriculture ranks high, but nevertheless only about one fourth of all "gainfully occupied" persons are farmers or farm workers. Moreover, the proportion is smaller at present than at the time of the last census of occupations (1920) shown in the diagrams. The agricultural census of 1925 revealed an absolute (not merely relative) decrease in the population living on farms, and this decline is apparently continuing. As has been pointed out, so efficient is agriculture in the United States, and so abundant the land, that a moderate fraction of the people suffice not only to furnish the basic food supply for the whole population but also to ship large quantities of farm products abroad. Three fourths of the workers are thus left free to provide for

wants less necessary than those which for the most part agriculture serves to meet.

In the United States, as in most countries, the other "extractive" industries — mining, forestry, and fishing —

A. PERCENTAGES OF TOTAL GAINFULLY OCCUPIED PERSONS



B. PERCENTAGES OF GAINFULLY OCCUPIED MALES

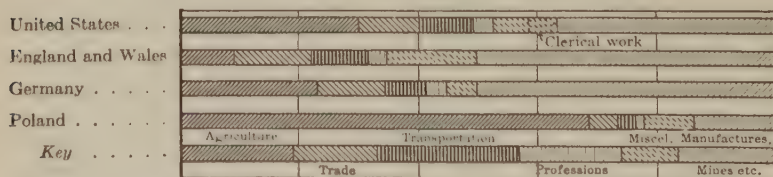


FIG. 31. Diagram showing occupations in the United States and other typical countries

The data relate to various dates from 1920 to 1925. They have been assembled by the League of Nations. The classifications in some cases are not closely comparable. On account of the different actual conditions and statistical practices with regard to the gainful employment of women, the distribution of occupations for both sexes combined is in some countries considerably different from that for males alone, shown in section B. Most countries classify clerical workers according to the branch of industry in which they are employed, whereas in the United States they are separately shown; if they were distributed, the fractions representing trade, transportation, and manufactures would be appreciably longer. Mine workers are combined with those in factories; in England they constitute 7.5 per cent and in Belgium 6.6 per cent of all gainfully employed persons, but in most countries (including the United States) not over 2 or 3 per cent

¹ Only five groups distinguished.

employ a far smaller number than agriculture. Much the most important of these is mining. With the country's abundant mineral resources, and with the great demand for metals to produce capital goods and for mineral fuels to furnish heat and power for homes and for industry, the mines (including quarries, oil wells, etc.) employ more than a million workers. Moreover, it is only because the mineral deposits are easily worked and because large quantities of capital are brought to the aid of labor that this number is able to produce such great quantities of minerals.

Industries of Transformation

The extractive industries, source of basic food and raw material, thus together employ somewhat less than three tenths of the American population. A slightly larger proportion is engaged in transforming the products of farm, forest, mine, and sea into more advanced commodities and structures. Among these transformation industries, of course, manufacturing is overwhelmingly dominant. The number of factory managers, foremen, and operatives proper is considerably less than the number working on farms; but if we add the clerical workers in factories, grouped under another head in the statistics, there is very little difference. Since 1920, the date to which Fig. 32 relates, the number in factories proper (as distinguished from repair and customs shops) has fallen off appreciably. This extraordinary phenomenon, reflecting a shift to occupations still farther removed from the strictly necessary, has been discussed in another connection in Chapter II, Section 7.

The trades having to do with construction accounted in 1920 for about 2,250,000 workers, or between 5 and 6 per cent of the total number. Although the volume of construction work has increased greatly since 1920, the number employed in this field has not grown correspondingly, for probably in no other branch of industry has the recent increase in output per person been more marked. Naturally construction

plays a larger part in a relatively new and growing country like the United States than in the countries of the Old World. Owing to Europe's impoverishment, however, the disparity in this respect has been more marked during the postwar years than before.

Apart from those in the building trades there are other handicraftsmen who work outside factories, making things for local use as distinguished from general distribution, and performing repair work. Formerly these local artisans were relatively numerous; for though the total consumption of fabricated wares was far smaller than now, there were few establishments that rose to the rank of factories, and the limitations of transport forced each community to provide for most of its own wants. Available statistics do not permit a sharp distinction between artisans of certain crafts working in factories and those working in their own homes or in small shops. There still remains some demand for goods to individual order. The chief support of the local shop, however, in this modern time is repair work, the volume of which is swelled by the constantly increasing output from the factories themselves. Indeed, the recent expansion of automobile-repair shops (these are not classed as factories by the census authorities, no matter how large they may be) has probably resulted in an actual increase in the total number of handicraft workers. Other classes of local craftsmen that reach considerable importance include blacksmiths, locksmiths, tinsmiths and coppersmiths, cabinetmakers, upholsterers, tailors, dressmakers and milliners, and shoemakers.

The American statistics of factory occupations, like those for transportation and trade, are not closely comparable with the returns for most other countries for the reason that the former distinguish a separate group of clerical workers, whereas elsewhere these are ordinarily distributed among the branches in which they are employed. Not far from half the clerical workers in the United States are employed in factories, and most of the remainder in stores and transportation enterprises. With this addition of clerical employees the

proportion of the population engaged in manufactures and related pursuits and mining (shown together in Fig. 31) is larger in the United States than in any other country, with the exception of Great Britain, Belgium, Germany, the Netherlands, Switzerland, and Czechoslovakia. In these highly industrialized countries (except Czechoslovakia, where the

proportion of farm workers is also high) domestic agriculture is insufficient to supply the needs of the people, and a large share of the output of factories and mines must be exported to pay for food and raw materials. The development of their manufacturing industry, therefore, does not reflect to such a degree as in the United States that balance among the branches of industry which results from, and which brings with it, high standards of

living. In the United States the high elaboration to which basic materials are subjected is largely a consequence of the abundance of these materials within the country itself. It is noteworthy that in Canada and Australia, where, as in the United States, land resources are plentiful, there is already a considerable development of manufactures despite the fact that these very new and thinly settled countries naturally devote themselves largely to agriculture and to stock-raising.

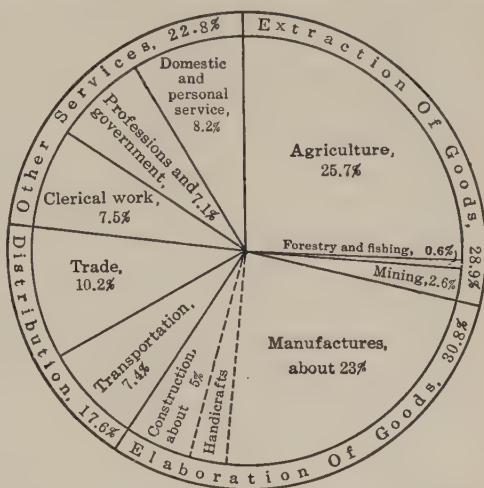


FIG. 32. Diagram showing occupation groups of the "gainfully occupied" population in the United States in 1920

The segregation between manufactures, handicrafts, and construction, shown by dotted lines, is approximate only. The diagram relates to both sexes combined. There has been a considerable shift since 1920 (see text)

In many countries the group of transformation occupations includes a larger proportion of handicraft workers than in the United States. For example, whereas in America most bread-baking outside the homes themselves is done in large plants equipped with labor-saving machinery, the bulk of the bread of Europe is made in small shops by almost purely hand methods. In Europe relatively more clothing and furniture are also made in small shops and to the special order of the customer. In the more backward countries of the world primitive hand methods of making wares are still more prevalent; some of them have scarcely reached in this respect the stage at which western Europe and America stood two centuries ago. However, a good deal of this hand work in such countries is done in an incidental way by the agricultural population rather than by those who give their time exclusively to it. Even including handicraftsmen the transformation industries, together with mining, account for only from about 8 to 15 per cent of the gainful workers in a number of countries of eastern Europe and Asia.

Transportation and Distribution

Three fifths of the workers in the United States are engaged in making "things" — extracting materials from the earth and changing their form; two fifths remain who perform services, most of which were most absurdly dubbed unproductive by certain early economic writers. Everyone now recognizes that to tip a scale or to occupy shelf room is by no means the sole test of usefulness. Any activity which satisfies human wants is productive. It is true that activities which do not incorporate themselves in physical commodities very commonly minister to wants less essential to human existence. The ability of any people to afford services abundantly is an indication of high standards of living. Though the statistics are not always closely comparable, they go to show that there are few other countries of the world in which the proportion of workers in the service occupations is so high

as in the United States. Where (as in England) it is higher, the fact is chiefly or wholly due to larger numbers of domestic servants.

Two of the major classes of services have directly to do with tangible commodities, though they do not create them; in the jargon of the economists they add place and time utilities to goods. The census occupational groups "transportation" and "trade" include, along with those who themselves handle goods, workers who transport human beings, who transmit communications, and who handle financial transactions of various sorts (bankers and insurance agents, for example). Together these branches of economic activity employed in the United States in 1920 somewhat over one sixth ($17\frac{1}{2}$ per cent) of the gainful workers, and the proportion would rise to fully one fifth were the clerical employees in this field added in.

Transportation and communication are of vast importance in the economic life of the country. With great quantities of goods to be handled, with long distances to be traversed, and with the transaction of intricate business, requiring for success the utmost dispatch, the railway, the steamship, the motor car, the airplane, the post, the telegraph, the telephone, and the wireless have an immense task. According to the census of 1920 the specialized occupations connected with transportation and communication employed $7\frac{1}{2}$ per cent of the gainful workers of the country (without counting clerical workers and certain mechanics engaged in repair and similar work). About half the group consists of steam-railway employees. It is probable that by reason of the recent rapid increase in the use of automotive busses and motor trucks and the continued expansion of the telephone business, the proportion of workers in this group has risen somewhat since the census was taken, although improved methods have resulted in reducing the number working on the railways.

It is impossible to make significant comparison with other countries as regards the relative number engaged in trans-

portation and communication. The conditions to be met differ widely, as do the methods of meeting these conditions. In a backward country where goods are handled in large part by human beings, pack animals, and slow-moving boats, an insignificant volume of transport may require as many workers as an immense volume where modern methods prevail. The degree of density of the population affects the amount of transportation needed; even were there no difference in standards of living the great area of America would require relatively more transport workers than are needed in western Europe. We shall see later that in proportion to population far more goods are carried and far more use made of telephones in the United States than in all but two or three countries of the world. Owing to the high efficiency of American carriers and agencies of communication, however, the number of workers in these fields is not so great as might perhaps be expected. In European countries it takes more employees to handle a given volume of business.

Not counting the million or more of accountants, stenographers, and other clerical employees, "trade" claimed in 1920 a full tenth of the gainful workers of the United States. Most of these are engaged in merchandising in the narrower sense — buying and selling commodities; but there are also over six hundred thousand in banking, insurance, the real-estate business, and similar activities. The proportion of workers falling in the trade group has in all probability increased since the census was taken. A good many who have dropped out of agricultural and manufacturing industry have apparently entered this field. The business of selling automobiles, electric refrigerators, radio apparatus, and similar modern conveniences has increased by rapid strides, and under prevailing practices the staff required for distribution of this type is large. Again, the recent prosperity of the country and the unusual accumulation of savings have resulted in a marked addition to the numbers engaged in selling real estate, bonds, and other investment property.

The proportion of the population employed in the distribution of goods is higher in the United States than in most other countries. It does not follow that American methods of merchandising are less efficient. Large expense of distribution goes hand in hand with high standards of living. In the more backward countries each local community is largely self-sufficing. To a great extent producers can trade directly with one another or through the channel of a single middleman only. In the United States producers and consumers may be separated by half a continent, and goods must pass through two or three or perhaps half a dozen hands. Even in the countries of western Europe the merchant has to deal more with staple wares and less with elaborate and fancy wares than in the United States. It takes a bigger staff to handle a given value of the latter. Often an unconscionable amount of time is necessary to display them to the finicky prospective buyer; even the reasonable demands of the customer for choice among styles and patterns and sizes cannot be met in the offhand manner in which flour and nails can be sold.

There is waste in American distribution, no doubt. Too much effort is spent in trying to persuade the customer to buy what he does not need. "High-pressure salesmanship" is often spendthrift of brain, tongue, and printer's ink. For the most part the American consumer is responsible for any excessive cost in distribution. It is a luxury which his high income enables him to afford, just as he affords many a practically useless commodity; he thinks that he wants it because he does not know that other things will give him more real satisfaction. Education of the buyer is more important for improving distribution than education of the seller.

Americans who have had experience in shopping in foreign countries will scarcely grant that methods there are more efficient. Most of the shops are small, they handle only narrow lines, and they have a very low and slow turnover. Many American department stores, chain stores, and mail-order houses (the two classes last mentioned are very rap-

idly expanding), represent larger economic units and more elaborate organization than are found in the distribution system of any other country, if one excepts the great coöperative organizations of farmers and consumers that exist in a few foreign lands.

It is true that comparison of the number returned by the census as proprietors with the number of salespeople and other employees indicates that the average retail establishment in the United States has only two or three persons at work besides the proprietor. This is, however, only natural, since even in a rich country many stores must be small-scale affairs, especially in small communities and in the outlying parts of cities. The business of distribution is quite different from that of manufacture, where, provided good means of transport exist, a single concern may market its goods over a large section of the country or even over the whole country. Most retailing is of necessity a local job.

Miscellaneous Services

The four groups of occupations designated as "clerical," "governmental," "professional," and "domestic and personal" represent for the most part not services of handling goods but services rendered directly from one human being to another. Some of them, however, such as laundry work and cooking, represent in a sense transformation of commodities. The four groups together make up a little less than one fourth (22.8 per cent in 1920) of the gainful workers of the United States. Excluding the clerical group, most of whom are employed in connection with manufactures, trade, or transportation, the proportion becomes somewhat less than one sixth.

Highly ramified and elaborate production and distribution call for large numbers of clerical workers. A vast correspondence must be conducted. Multitudes of transactions must be recorded; numerous and intricate accounts must be kept. If labor is to be saved and other expenses mini-

mized, costs must be reckoned in finest detail. It is not surprising, therefore, that the clerical class — not to be confused with “clerks” (salespeople) in stores — is relatively large in the United States. It accounts for $7\frac{1}{2}$ per cent of the total number of gainful workers, nearly half the group being women.¹ This clerical staff serves as aid in all the great branches of economic activity.

The fact that more than two million men and women can be spared from the production and distribution of goods to engage in professional service is one of the results of the efficiency of American industry. The professional workers for the most part minister to the very highest of human wants, those farthest removed from the realm of the necessary. Advanced standards of living demand that more be done for the human body and the human mind. At the same time an advanced type of industry and commerce calls for more expert professional service.

In point of numbers (one may fairly say in point of social significance also) teaching ranks first among the professions. It claimed in the United States in 1920 about 800,000 workers; of these four fifths were women, who find here a peculiarly congenial field. In the early days teachers were usually ill paid, and deserved little more. Standards have rapidly risen. Today a great part of the teaching staff even in the public schools may justly claim to belong in the professional class, to say nothing of the forty thousand or more (estimate for 1928) professors in colleges and universities.

America's high standards of health are promoted by the services of about 150,000 physicians and surgeons, 60,000 dentists, and 150,000 trained nurses. There are some 130,000 clergymen and nearly the same number of lawyers. Technical experts in engineering, chemistry, and kindred fields total about 250,000, and the number is rapidly increasing. The professions which appeal to the æsthetic

¹ It is possible that through error of the census enumerators the number is swelled somewhat by including some of those who should properly be ranked as salespeople.

tastes and to the intellectual desires — architecture, art, music, literature, drama, journalism — each claim many thousands, the aggregate being in the neighborhood of 300,000.

The group of occupations segregated under the heading "Public Service not elsewhere Classified," and representing about 2 per cent of all gainful workers, by no means includes all employees of the national, state, and local governments. Most teachers, for example, are on government pay rolls, and so are scores of thousands of clerical workers.

Various estimates of the total number of government employees have been put forward, but these are not altogether satisfactory. It is impossible, for example, to ascertain how many of the employees of construction contractors are doing work on public enterprises. Some, who believe that governments not only are extravagant but undertake to do more than they should, complain that one worker out of thirteen or thereabouts "feeds out of the public crib." It does not fall within the province of this book to discuss the proper scope of the functions of government. Governments of all grades the world over are tending to expand their activities. This seems the unavoidable outcome of the growing interdependence of individuals, industries, communities, and nations. Above all, the growth of cities creates new needs that only public action can meet. The good roads and good schools demanded by advancing standards are among the big factors in government expenditure. Whatever may be his views as to government policy or as to the efficiency of public management of business, the American may perhaps take comfort from the fact that in most countries which make any claim to high civilization the proportion of public servants is as great as in the United States, if not greater.

At first thought one might perhaps expect, from the fact that the United States is the richest of all nations, that the number of persons in domestic and personal service would be exceptionally large. The well-to-do family ought to be able to hire many to serve its personal wants and whims.

As a matter of fact the servant class, in the strict sense, is smaller in America than in a good many countries of Europe or than in some countries of other continents. The census group of domestic and personal service comprises in its entirety about 8 per cent of the gainfully employed, itself not a large fraction ; but not one third of these are servants in the common usage of that term. In England the group as a whole comprises 12 per cent of the total, and servants make up more than half of the group.

The peculiarity of strictly domestic service is that it is performed in the home of the employer, involving a personal relationship traditionally altogether different from that between employer and employee in the factory, the store, or the office. Much the greater number classed by the census in the general group of "domestic and personal service," including many even listed merely as "servants," are not in this case. Either they are independent workers and their own bosses, or they are employees of concerns very distinctly engaged in business, such as hotels, restaurants, laundries, barber shops, and the like. Such employees, for the most part, are not thought of as servants either by themselves, by their employers, or by the general public. Their economic and social position is little different from that of workers in other branches of industry, and in general they are fully as well paid. It is natural enough that the high standards of living in America should demand the employment of very considerable numbers in personal services of this less menial type. Americans are great travelers, and must needs have many and well-manned hotels. Most of them can afford clean clothing ; hence the need of many laundry workers. The higher grades of apartment houses have janitors and elevator operators in numbers unknown in similar buildings in Europe.

On the other hand, it is equally natural that even though very many families in the United States have liberal incomes, the number that employ household servants is relatively small and is proportionately much less today than half a

century ago. The reason is that the masses of the people are so well off that they feel little pressure to accept this form of employment, commonly held less dignified than others. Because the country is rich, this particular form of luxurious consumption is largely denied to it. Wages of all workers in America are much higher than in Europe, but the disparity in the case of household service is greater than in most other employments because of the distaste for the name and the life of "servant." The time may come when work in the home will be so organized as to give the employee as much independence and as much satisfaction as work in the factory or the office. In that case, there may readily be a marked increase in domestic service.

This analysis shows that the occupations of the American people are characteristic of a rich and prosperous country where economic well-being is widely diffused. The elaborate industries employ more than the extractive. The rendering of incorporeal services employs two thirds as many as the production of tangible goods. Professional service is highly developed. Relatively large numbers are employed in those personal services which are not considered menial. Distribution claims an exceptionally large fraction of the gainful workers. Everywhere the broad lines of the picture indicate exceptional application of human energy to those commodities and services which rank above the bare necessities of life.

SECTION 3. OCCUPATIONS OF MEN AND WOMEN

The broader economic aspects of the work of women in gainful occupations outside the home have been discussed in Chapter I. It was noted that the high average family income relieves American women from such heavy burdens of toil as their sisters in most other countries must bear. On the other hand, the transfer of many forms of production from home to factory has led to an increase in the proportion of women who work for money wages, especially in their younger years. It remains here to compare the distri-

bution of the two sexes as regards character of occupation. Fig. 33 shows for men and women separately the proportion engaged in each major branch of work, and Fig. 34 the part played by each sex in these branches respectively.

The differences in occupation as between men and women are partly due to differences in physical strength and in other characteristics. To an even greater degree, however, they are the result of tradition. There are some tasks for which the average woman has scarcely the necessary size and muscular capacity. On the other hand, a good deal of the work which in America is customarily considered too hard for women makes in fact no more demand on strength than do the household tasks, and in foreign countries is often done by women. The fact that until recently women were virtually excluded from most professions and from the higher business employments was largely a matter of prejudice.

In all so-called gainful occupations in the United States taken together, men outnumber women not quite four to one. The proportion rises to nine to one in agriculture, thirteen to one in transportation, and several hundred to one in mining. In the manufacturing and mechanical industries and also in trade the ratio of the two sexes is not very different from that in all occupations combined, between one fifth and one sixth of the workers being women. Very different is the situation in the three other major groups of occupations. In domestic and personal service there are eighteen females for every ten males. In professional service and in clerical work there are not far from as many women as men.

Since men constitute about four fifths of the gainful workers, their distribution among the several groups of occupations is not very different from that for both sexes taken together. The extractive industries — agriculture, forestry, fishing, and mining — claimed in 1920 almost exactly one third of the male workers; the transformation industries — manufactures, construction, and the like — substantially an equal number. Transportation and trade gave employ-

ment to nearly one fifth of the men, leaving $14\frac{1}{2}$ per cent in public, professional, clerical, and domestic and personal service.

Altogether different is the picture of the work of women. In 1920 more than one fourth of all the gainfully employed women were engaged in domestic and personal service, factories claimed about one fifth, clerical occupations one sixth,

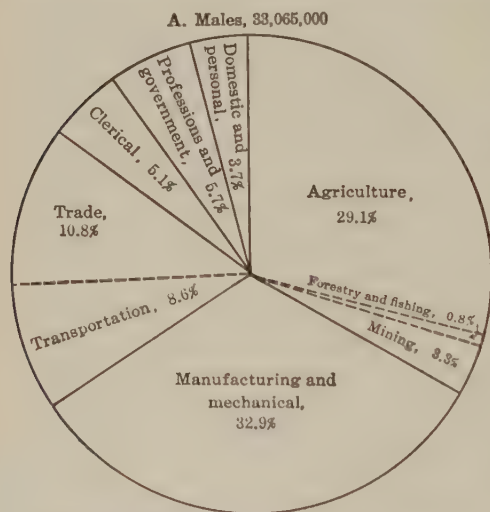


FIG. 33 A. Diagram showing occupation groups of "gainfully occupied" males in the United States in 1920

and professional service one eighth, leaving only 23 per cent in the four groups agriculture, mining, transportation, and trade, which account for considerably more than one half of the male workers. Of the gainfully employed women reported as working on farms, more than half were Negroes in the South.

In this modern day women have little more inclination than men to enter strictly

domestic service (hired work in the home), and the opening of new avenues has enabled them increasingly to shun this form of employment. Although about a million of the female workers in 1920 were reported as servants and another hundred thousand as waitresses, a large proportion of these do not work in private homes.

The proportion of women employed varies greatly in the different manufacturing industries. It is insignificant in such "heavy" industries as steel manufacture and sawmilling and in such technical industries as the manufacture of machinery and automobiles. On the other hand, there are about as

many women as men in textile and clothing factories, and the proportion is large in various other light branches. The variety of factory tasks done by women steadily increases.

Women far outnumber men in teaching, which gives employment to more than 700,000 of them. Nursing is also one of the leading occupations of women, the trained nurses (ranking with the professional group) and the untrained (classed under personal service) numbering together in the year 1920 more than 275,000. Women outnumber men as musicians and teachers of music and (more than six to one) as librarians, and represent roughly half the total in several of the other professional and semiprofessional pursuits. Considerable numbers have even pushed their way into professions traditionally masculine, such as the law, medicine, dentistry, divinity, and architecture.

In trade the great majority of women are salaried employees, chiefly saleswomen in stores, in which field they are nearly half as numerous as men. Under the clerical group women greatly outnumber men as stenographers and typists, and represent nearly half the bookkeepers, cashiers, and accountants. Most of the women reported in the transportation group are telephone operators; in 1920 these numbered 178,000, and despite the increasing use of automatic systems the expansion of the telephone business has probably resulted in further addition to that number.

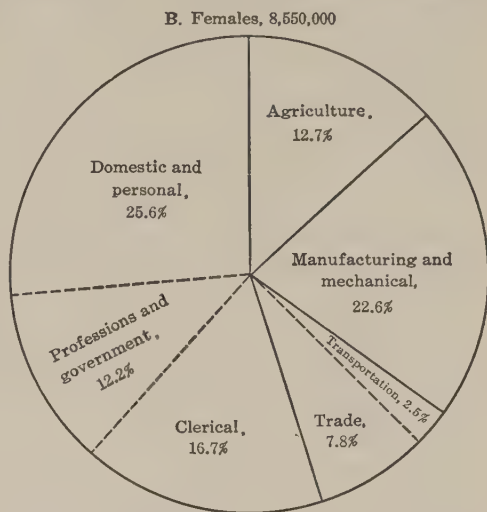


FIG. 33 B. Diagram showing occupation groups of "gainfully occupied" females in the United States in 1920

SECTION 4. THE SHIFT IN OCCUPATIONS

Just as the present distribution of occupations in the United States evidences high productivity of industry and advanced standards of living, so the shift in occupations that has taken place throughout the history of the country bears witness to increase in productivity and rise in general well-being. There has been a wholesale movement from branches supplying bare necessities to those which provide conveniences, comforts, and luxuries. This change has been practically continuous since the days of first settlement, but for early periods there are no comparable statistics by which to measure its pace. The fact that every census back to 1790 has revealed a growing proportion of city dwellers in the population (see Section 5 of this chapter) is proof that manufactures and commerce have constantly gained relatively to agriculture.

More satisfactory occupation statistics exist as far back as 1850. In that year not far from three fourths of all the gainful workers were on the farms, as compared with barely one fourth at the present time. With the opening of new and more fertile lands, the greater use of capital, the introduction and improvement of farm machinery, and advance in technical methods, American agriculture has been able decade by decade to produce more per man. A larger and larger part of the population could thus be spared for the elaborative industries and the higher services. Agricultural progress paved the way for progress all along the line. The fact that the number of farmers in the United States has increased far less rapidly than the total population does not signify decadence of the farm, but precisely the opposite. Nor does it signify any decline in the capacity of the country to supply its basic needs of food and agricultural raw materials. On the contrary, a large export of farm products has been maintained; the proportion available for shipment abroad is not much lower today than it was half or three quarters of a century ago. The increasing importation of food-

stuffs is due exclusively to the greater wealth of the people, whereby they are enabled to pay for more luxuries and semi-luxuries of a kind for which the soil and climate of the United States are not adapted.

The shift in occupations from 1880 to 1920 is shown in Fig. 34. Changes in methods of classification make it necessary to combine certain of the groups now segregated in the statistics, reducing the number to five.¹ The latest available figures are for 1920; since that time, as has been indicated, a halt has been marked in the previous increase in the proportion of workers engaged in manufacturing industries (see Chapter II, Section 7).

In the forty years between 1880 and 1920 the proportion of gainful workers found on the farms, together with the small number in forestry and fishing, fell from nearly 50 per cent to 27 per cent. Against the increase of more than 110 per cent in the population, the number in these occupations grew by only one third; very little increase appeared from 1900 to 1920, and of late years there has been absolute decline. All the other great groups of occupations gained in relative importance during this forty-year period, though the proportion in domestic and personal service advanced but little, and even fell somewhat after 1900.

The rapid increase in the number of factory and construction workers between 1880 and 1920 was to be expected. This was the most obvious channel to which a large share of the advancing productive capacity of the country should turn. The more specific figures for mine workers (not shown separately in Fig. 34) indicate fully as rapid advance as in manufactures. The progress of industry and of transportation

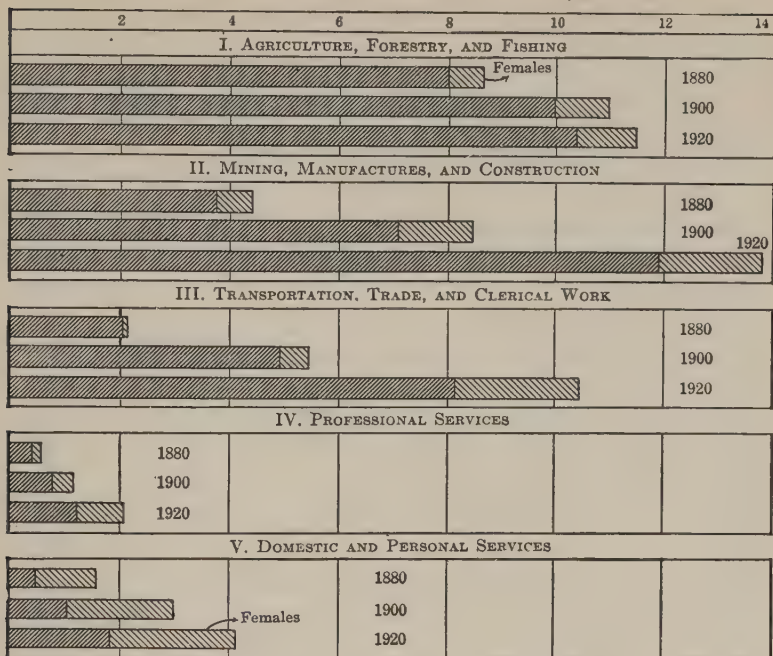
¹ The original census figures of occupations have been subjected to certain adjustments, partly on the basis of estimates. Changes in the form of census questions, instructions, and nomenclature, and in the time of the year at which the enumeration was conducted, make some of the data incomparable, especially those for women and children engaged in agriculture and those for unskilled miscellaneous labor. The adjustments follow for the most part those suggested by Whelpton in *Journal of the American Statistical Association* (July, 1926), but with some additional modifications.

has demanded from the miner more and more fuel to furnish power and more and more metals, stone, and other materials for the creation of productive capital and other permanent equipment. In 1920 more than three times as many as in 1880 were employed in mining, manufactures, and construction, taken together, and the proportion of such workers in the total rose from 26 per cent to 33 per cent.

The growth of mining and manufactures meant both greater volume and greater diversity of products, and therefore more need of exchanging them one for the other. As a result marked expansion appeared in both transportation and commerce. Workers in these fields, together with those in clerical occupations (which cannot be segregated in the earlier statistics), multiplied five times in forty years, and the proportion of the total advanced from one eighth to one fourth. The need for the increasing proportion of transport workers is evident enough, not only from the greatly increased quantity of commodities to be moved but also from the spread of population, agriculture, and industry over vast areas of the West and from the opening up of mineral deposits in widely separated localities. The need for relatively more clerical workers arises from the ever greater size and complexity of individual business enterprises and the more numerous and intricate relations among these.

Some persons, however, find it difficult to justify so great an increase in the number engaged in mercantile pursuits. They argue that distribution has lagged behind industry and transportation in progressiveness; that merchants have failed to make due effort to eliminate waste and to cut out superfluous workers. It is only natural, however, that the volume of distribution service required should have expanded swiftly in view of the rapidly increasing production of commodities and the advance in standards of living. It is one thing for the farmer to sell his watermelons or his apples or his butter in the neighboring village, and quite another thing to send them from the Texas prairie or the Washington orchard or the Minnesota farm to the table of the New

A. NUMBER OF PERSONS GAINFULLY OCCUPIED, IN MILLIONS



B. PERCENTAGE DISTRIBUTION. BOTH SEXES

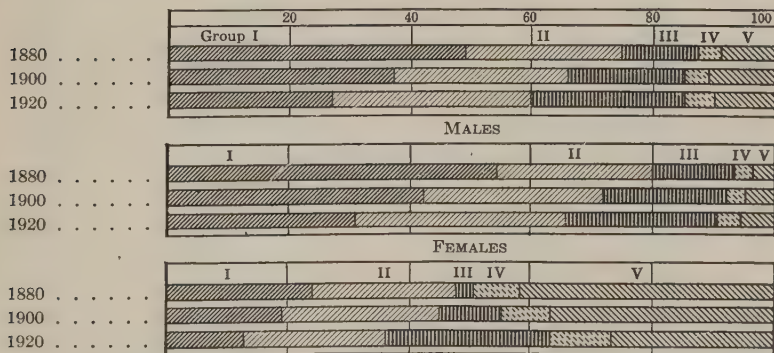


FIG. 34. Diagram showing the shift in occupations in the United States from 1880 to 1920

Because of changes in census definitions and classifications, adjustments have been made as stated in the text. There have been further considerable shifts in occupations since 1920, notably an actual reduction in the number employed in groups I and II, with an increase in the other three groups (see Chapter II, Section 7)

Yorker or the Bostonian. It is one thing to sell simple cloths to be made up in the home, another to sell elaborate garments of the latest mode and of bewildering variety. Such changes necessarily mean more numerous, complex, and precarious mercantile transactions.

The expansion of commercial and clerical activities has been accompanied by an immense invasion of this field by women. Of the total number of workers in transportation (where women still play little part except in telephone service), trade, and clerical service, women and girls were less than 4 per cent in 1880 and over 22 per cent in 1920.

A gradual increase appears in the proportion of professional workers. This again is characteristic of a more complex life and higher standards of living. More intricate business relations demand more lawyers; greater care of health calls for more doctors and dentists and nurses. Above all, increase in the amount of instruction given to youth, and improvement in its quality, have swelled the number of teachers, nearly four times as many being reported in 1920 as in 1880. On the other hand, from 1880 to 1920 there was little change in the proportion of gainful workers employed in domestic and personal service.¹ A decided decline took place in the proportion of household servants, and the class as a whole maintained its relative importance only by reason of the increase in other forms of personal service. Although advance in incomes has added to the number who can afford to employ servants in their homes, it has cut down the number who are under pressure to accept this form of employment. Wages of domestic servants have advanced much more than those of most other classes, but without attracting greater numbers. In 1880 the group of domestic and personal service included 42 per cent of all gainfully employed women; in 1920, only 27 per cent. It is probable that

¹ At the earlier censuses there were assigned to this class a large number of soldiers, policemen, and similar government employees who in 1920 were placed in a distinct group; for purposes of comparison Fig. 34 is based on the old method of classification.

the number of strictly household servants had actually declined, in the face of an increase of over 110 per cent in the population.

This great shift of workers from agriculture to elaborative industries, transportation, distribution, and personal services would have been impossible had there not been an immense increase in per-capita production. Work has changed because work has become more efficient.

SECTION 5. THE DRIFT CITYWARD

The radical changes that have taken place in the occupations of the people have had many profound social effects, apart from the general increase in wealth which has caused these changes and to which in turn they have contributed. Of these social effects only one is of such a character as to fall properly within the scope of this book; namely, the drift to the city. From being predominantly farm dwellers Americans have become in large proportion dwellers in towns and cities, and the individual cities have grown larger and larger. In 1820 only 5 per cent of the population was found in cities of eight thousand or more inhabitants. By 1870 the ratio had risen to 21 per cent, and by 1920 to 44 per cent. Another considerable fraction of the people lives in smaller cities and towns. Places of twenty-five hundred or more inhabitants comprised in 1880 less than three tenths ($28\frac{1}{2}$ per cent) of the total; in 1920, more than half ($51\frac{1}{2}$ per cent). If all incorporated places, regardless of size, be classed together, the proportion of town dwellers at the last census rises to three fifths. By 1930 it will probably be nearly two thirds.

One of the principal causes of this urbanization movement has been the superior advantages of the large center for the conduct of manufactures and trade. About three fourths of American factory industry is in cities of more than ten thousand inhabitants, nearly half in those exceeding one hundred thousand. Factories, the world over, have tended townward.

Even where some manufacturer seeks out a virgin spot on which to locate, his single plant is often so big that its workers make a fair-sized city in themselves. In certain cases a given locality offers to industry a peculiar combination of advantages as respects access to materials, to sources of power, and to markets for finished products. Once a city gets a start, it becomes *per se* an attractive force pulling other factories and mercantile establishments to itself.¹ Its sheer size makes it a good market for the employer seeking men and for the worker seeking a job. Once transportation facilities are created to meet the first industrial development, they offer advantages to new establishments. The economic forces at work are self-perpetuating and cumulative, at least up to a certain point.

Social and psychological factors have joined with the economic to build up cities — the glamour of the crowd, the conveniences of living, the freer access to means of amusement, instruction, and æsthetic enjoyment. Immigration has contributed heavily to the growth of cities; one reason for this is the fact that the newcomer could find in the big city many others of his nationality and language, perhaps assembled in colonies, thus making a link with his old life.

Many a lament has been uttered over the evils of this powerful cityward drift. The independence of the land-owning farmer is contrasted with the dependence of the wage-receiving, home-renting worker in factory or store or office. The joy and health of work in the open air, in the presence of nature's beauty and hand in hand with nature's forces, is set against toil indoors with roaring, soulless machines, fusty goods, or routine papers and figures.

The city, of course, has its dark side. But the cure is not to be found in stopping economic progress. Unless other industries grow faster than agriculture, there is stagnation. The demand for farm products is necessarily limited, for the

¹ The influences tending toward concentration of factories in cities are more fully set forth in Chapter X, Section 5.

variety of them is small, and the human body wants only so much food and raiment. The demand for factory products is unlimited, because their variety can multiply indefinitely. Increase in productive capacity must turn chiefly to occupations other than farming, to industries and activities that to a large extent must be conducted in the town. The improvement of social life must be sought not in going back to the farm, but in bettering conditions in the cities themselves and in turning expansion as far as possible toward small and medium-sized places rather than to the great metropolis. That much has been done already to make city life more sane, comfortable, and healthful, more appealing to the highest desires, is conspicuously evident. That more remains to be accomplished is equally evident.

As a matter of fact economic forces favoring the location of factories in the biggest hives of population are in considerable measure losing their potency. Freight-transportation facilities are now substantially as good in many of the smaller towns; freedom from congested terminals may count more than the presence of a great network of converging rail and water lines. Improvements in passenger transportation and in communication, and advance in the intelligence of the working classes, make it easier to draw labor from sources more or less distant. Electric transmission of power breaks the tie which bound the factory to the waterfall or to the point where coal could be brought cheaply to its door. On the other hand, the bigger a city grows the higher taxes become, and overcrowded streets may seriously hinder employees in coming to their work and also hinder movement of materials and products.

Side by side with these economic trends there are changes affecting the life of the people. The city, despite all the progress it may make, loses some of its advantages as a home when it gets too gigantic; for one thing the crowding of its transportation facilities becomes almost intolerable. And the small town, even the rural district, grows year by year more eligible. The good road, the automobile, the good school, the

radio, the moving picture, the electric light, have become almost universal heritages. "Hickville" and "Podunk" and "hayseed" jokes are fast going out. Even the lover of crowds can find them surging in the modern small-town street of an evening.

This shift in the economic and social conditions of large and small cities has already exerted an influence on the location of factories. Many plants have been moved out from big cities, and many new establishments have been located in smaller places. But the forces working in the other direction have by no means yet disappeared, and it is impossible to forecast the future outcome of the tug of war between the vast metropolis and the small town as locations of industry and of the homes of the people.

SECTION 6. MAJOR CONTRIBUTORS TO NATIONAL INCOME

As has already been stated, there are no systematic statistics concerning several of the important contributions to the national income, notably the value added to commodities by wholesale and retail trade and the value of governmental, professional, domestic, and personal services. Unofficial estimates, which must be considered rough approximations only, have been made concerning these contributions, and these estimates, together with the more nearly precise data regarding income derived from other branches of activity, are combined to give the total estimated national income.

The latest, and probably the most trustworthy, analysis of national income is that presented in the report (published in 1929) of the Committee on Recent Economic Changes.¹ The data, which relate to 1926, are shown in section *B* of Figure 35. The combined total of the national income, according to this estimate, was not quite \$86,000,000,000 in that year.

¹ Published by the McGraw-Hill Publishing Company. The committee was established by Mr. Hoover at the time when he was Secretary of Commerce.

Section *A* of this diagram shows the number of workers¹ in those major branches for which statistics are available and also the value of product. The latter must not be confused with the net income derived from the given branch of industry. For example, no deduction has been made for depreciation. Moreover, every great branch pays out to other branches for materials, machinery, and services part of the gross revenue it receives. No deductions have been made in the diagram for these payments except that in the case of manufactures the cost of materials, fuel, and electric current has been subtracted (there are some other minor payments made by manufacturers to other industries which have not been deducted). The figure given for agriculture in the diagram is exclusive of the duplication due to the feeding of crops to live stock, but no deduction has been made for seed. Except for manufactures and agriculture the values shown in section *A* represent the total receipts of the given branch of industry in 1927 (1926 for agriculture and the mean of 1926 and 1927 for mining). Some of the items both of number of workers and value are partly based on estimate, but the amount of estimation involved is less than in the case of section *B* of the diagram. The net income of the branches of industry covered by section *A* represents in the aggregate somewhat over half of the total national income.

Most products of the extractive industries require some kind of transformation before use. Grain must be ground,

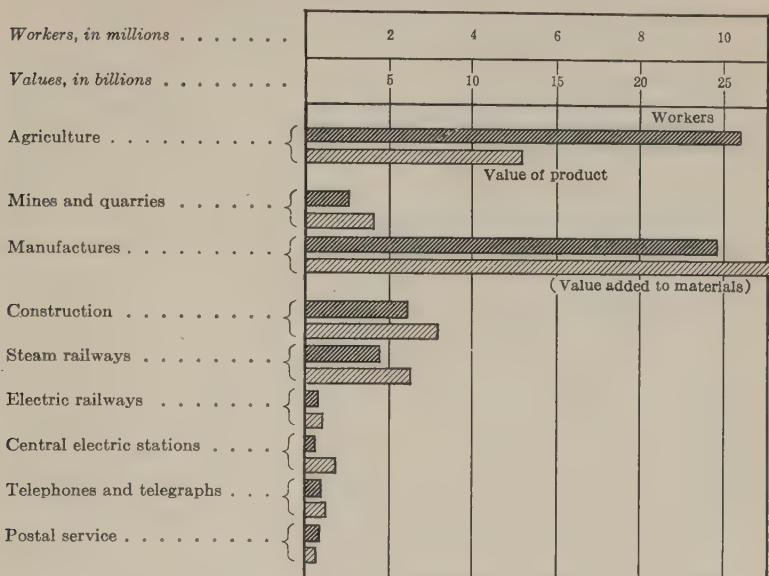
¹ The figures used as to persons engaged are not the same as those presented in Section 2 of this chapter, except in the case of the agricultural workers. They are not taken from the census of occupations, the returns for which are made by the individual worker, but from special censuses and other official reports for which data are supplied by the employers. Clerical workers, who constitute a separate class in the occupation statistics, are here reported as part of the staff of the several branches. In the case of manufacturing and mining the census schedules call for the number employed on the fifteenth of each month during the census year; these figures are added and divided by twelve to give the average number of wage-earners. For a seasonal industry this average may be much less than the number employed at the time of maximum operation, but more truly represents the amount of labor-power applied in producing the given product.

animals must be dressed, many kinds of food must be cooked, and textile raw materials must be spun, woven, and sewed. Logs must be sawed and metals smelted and wrought. Consequently, if one were to judge the relative importance of manufacturing industry by the gross value of products, including that of the materials, it would in most countries outrank any other branch of industry, if not all others combined. The economic significance of manufacture, however, is measured by the degree to which it modifies the materials. In a rudimentary society the transformations wrought are for the most part of a simple character. They are largely performed in the home, on the farm, or in the forest; factories, in the common understanding of the term, may scarcely exist. In an advanced industrial country such as the United States the elaboration of materials is carried much farther. Despite power-driven machinery and other devices which reduce costs, the value added by the manufacturing process comes, in the case of most commodities, to exceed greatly that of the raw materials. Moreover, in such a country the greater part of the work of transformation is conducted in distinct establishments—factories primarily devoted to that purpose. American statistics of “manufactures” relate only to factories in the narrowest sense of that term. Even in the United States, however, the transformations wrought on materials in the homes, on the farms, and in the great number of small handicraft shops, repair shops, and shops working to individual order, create a large total value which does not appear in Fig. 35, A.

The gross value of strictly factory products (excluding duplication) is approximately \$40,000,000,000 yearly, or not far from half the total national income. The net addition made by the factories to the value of materials furnished by farm, forest, and mine is over \$27,000,000,000, more than equal to the combined contributions to national output of all raw-material-producing industries and all transportation and other public-utility enterprises.

According to the available statistics (which probably somewhat understate the value of farm products) agricul-

**A. NUMBER OF WORKERS AND GROSS VALUE OF PRODUCTS (EXCLUDING
DUPLICATION) OF SPECIFIED BRANCHES OF INDUSTRY, 1927**



B. ESTIMATED DISTRIBUTION OF THE REALIZED NATIONAL INCOME, 1926

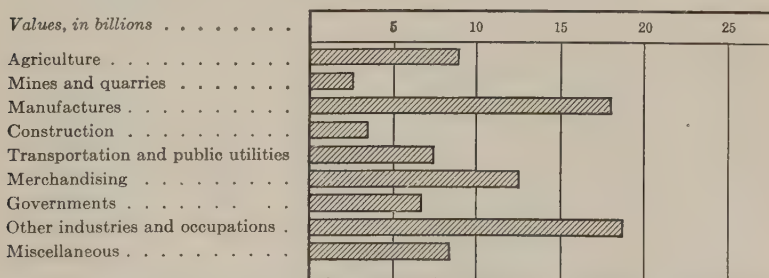


FIG. 35. Diagram showing major factors in national production and income

In section *A*, compiled from various sources and partly based on estimates, data are shown only for those branches for which more or less complete statistics are available. Section *B* represents estimates of the Bureau of Economic Research (published in *Recent Economic Changes*, 1929). The figures are for net income, and only for that part thereof which is "realized"; in particular, the additions to the surpluses of corporations, not distributed as dividends, are not included (their inclusion would add materially to the values for manufactures and for transportation and public utilities). Certain of the estimates in section *B* are based on fairly complete statistics, but others are rather rough approximations. For further explanations of the diagram see the text

ture produces a gross income, exclusive of duplication, of twelve or thirteen billions annually. Mining ranks much below agriculture, as it does in practically all other countries. Because nature has been generous the major minerals are of relatively little value in the ground, and the cost of extracting them is moderate — at least at the present stage of development. No other country has a mining industry approaching that of the United States in magnitude, and in few does it rank so high among the great branches of industry.

Construction has been especially important in American economic life during recent years. The cost of buildings, roads, and other products of construction has been between seven and eight billion dollars yearly, half of which, or perhaps somewhat more, represents the value of materials supplied by other industries. The mere growth of population calls for a considerable annual addition of houses and other buildings and of improved streets and roads and the like. Moreover, the practical cessation of normal construction work during the war caused a shortage which has had to be made up. However, a great part of the work of the last few years has represented the provision of more attractive, comfortable, efficient, and enduring structures and of better facilities for living, for producing, and for conducting business. This is one of the many evidences of the high national income.

The electric central station is in a sense a manufacturing plant, transforming the energy of falling water or of fuel into light and power. The output of electric current has become enormous; the annual value is more than \$1,800,000,000, of which about three fifths is from current for lighting and for various domestic uses and the rest from power for factories and other large-scale enterprises.

Services of transportation and communication create a gross income of about eleven billions annually.¹ The steam railways are much the most important contributor, but the

¹ Including certain minor transport services: motor trucks operating for hire, busses, cabs, express companies, the Pullman company, and the like (see Chapter XI, Section 1).

expanding telephone business has become a significant item. The average American pays for telephone service about one dollar out of eighty of his income, an indicator of the extremely wide use of this modern convenience. Of steam-railway receipts about three fourths are from freight, and the amount contributed by passengers is about the same as the electric railways take in. Passenger traffic of both these classes has been cut down by the immense use of motor cars.

Turning now to the estimates of the net income derived from major branches of industry (section *B* of Fig. 35) it will be seen that manufacturing is much the largest single contributor and that the mercantile business ranks next, with agriculture third. Of the several classes whose income is combined under the head "Other industries and occupations" the most important are the so-called personal service occupations, the professions, and the financial activities such as those of banks and insurance companies. The small handicrafts are included here rather than under the heading of "Manufactures." The last bar, labeled "Miscellaneous," consists chiefly of the rental value of homes, including homes on farms, and returns on foreign investments.

This analysis of the contributions to national income, like that of occupation statistics, emphasizes the high degree of well-being in the United States. The character of American production mirrors the character of American consumption. Comparison of values created by the several branches shows that production is of a highly advanced order. Goods and services that provide for the less essential wants are a great proportion of the value created.

Although for convenience section *A* of Fig. 35 shows side by side the number of workers and the gross value of products of major branches of industry, it is impossible to draw from these data any definite conclusions as to the relative productivity of the several branches per person employed therein. As already stated, in several of the branches shown large payments are made out of the gross income to other industries. Moreover there is little significance to be attached

to a comparison between the number of workers in the several branches and the estimated net income of the corresponding branch as shown in section *B* of the diagram. Any adequate study of these relations would require more detailed statistics than are here presented. There is no doubt that in some branches of industry the average value of net output per person engaged is materially greater than in other branches. Among the factors which cause differences in this respect may be mentioned temporary variations in the relative price levels of the several classes of goods and services, differences in the prevailing skill and efficiency of the workers, and, above all, differences in the extent to which natural resources and capital come to the aid of the human hand and brain. It cannot be too strongly emphasized that the value of the product of a given industry is, with rare exceptions, greater — in most cases much greater — than the value created by the workers in that industry. Land, mineral deposits, and machinery are just as truly contributors as are human beings.

Take for example the mining industry as compared with the construction industry. The average value of output per person employed is much the greater in the case of mining, although if we exclude from this group the petroleum business, with the altogether abnormal average of about \$10,000 worth of product per person, the disparity is much less marked. But the building contractor makes no use of natural resources, possesses scarcely anything that can be called a plant and usually makes only a relatively small use of machinery. On the other hand, the value of minerals in the ground (especially in the case of petroleum) is a factor of considerable importance; besides, the mine operator must make heavy investment in opening shafts, drilling wells, and equipping his plant with costly machinery. The individual wage-earner in building construction is fully as well paid as in mining, and the rewards for management, as distinguished from return on capital and from land rent, are fully as high.

Discussions of returns to farmers are usually productive of more heat than light. On the face of the statistics of value of output the farmer is pretty badly off; if instead of taking averages for the whole country, distorted by the unequal geographical distribution of the different branches of industry, comparisons are made section by section, the disparities between agriculture and other industries are less marked.¹ The position of the farmer would, however, appear considerably more favorable were it possible to value farm products more perfectly. Not a little of the output of vegetables, fruits, and dairy products is consumed directly by the farm family. Some of this unavoidably escapes attention in the statistics, and the value of the rest is reckoned on the basis of the prices the farmer receives for what he sells — prices often very much below those that the city consumer must pay for the same things at retail. Again, the farmer is largely free from certain expenses which cut deep into the budget of most workers in other industries. He has the use of a house where others must pay rent. If he owns his farm this undecaying asset obviates or limits the need of setting aside savings or of carrying life insurance. These considerations qualify materially the significance of the relationships shown in Fig. 35; but there is no doubt that during recent years many farmers, if not most, have not been so well remunerated as persons in most other branches of industry.

Disparity between the average value of output per worker in agriculture and in other industries is not peculiar to the present day or to America. As far back as statistics go, and in every country, we see the same thing. The explanation must lie deeper than it is usually sought. Even in 1919 the reported average value of output per worker was much greater in manufacturing than in agricultural industry, though for some twenty-five years prices of farm products had been rising faster than those of factory products. Throughout this same twenty-five years prices of farm land had risen by leaps

¹ With regard to the dominance of agriculture in the South and the average income of the farmer there, see Chapter VIII, Section 6.

and bounds, far outstripping the pace even of farm products. This fact seems to indicate that farming was at that time scarcely considered a less attractive occupation than others.

It does not lie within the scope of this book to enter into a subject so full of controversy as the causes of the recent less favorable position of agriculture. Some points bearing upon it are mentioned in Chapter II. Powerful, though slow-working, economic forces seem tending to restore the disturbed equilibrium.

SECTION 7. INTERRELATIONS OF THE BRANCHES OF INDUSTRY

Economic life is not a mere aggregate of separate activities: it is a coherent organism. Every branch is dependent on every other branch. Particularly conspicuous are the interrelations between the extractive industries and the manufacturing industry, that channel through which, in an advanced country, so great a proportion of the goods finally flows before they are ready for use. In Fig. 36 the distinction is made between the manufacture of food and that of other commodities, for the reason that food products are usually subjected to far less costly transformation than are others. In the food factories raw materials (including fuel and power) represent about two thirds of the total value of product; in other factories, taken as a group, the proportion is only about one quarter, a fact which bears witness to the very high degree of elaboration which the materials undergo. The figures of the value added to materials by nonfood factories are so large that it is difficult to show them without at the same time obscuring the other data by too small a scale.

It will be seen that not far from half the products of the farms, in terms of value, is sent to American factories for transformation. About one seventh of the total is exported (not distinguished in the diagram); an especially large fraction of the cotton and of the wheat goes abroad. The rest is consumed in crude condition or with only such incidental

adaptation, such as churning of butter, as can be performed on the farm itself. The principal farm products thus used directly are fruits, vegetables, eggs, milk consumed as such, and farm-made butter. Of the total value contributed by the farms to the factories about three fourths is destined for food. The farmer's wheat goes to the mill, his cattle and hogs

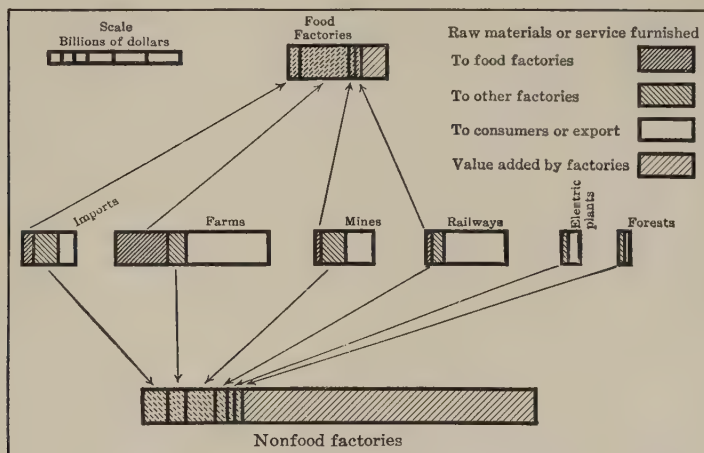


FIG. 36. Diagram showing the relation between manufacturing and other branches of industry

The statistics show the value of the products and services of the farms, mines, forests, railways, and electrical plants, distinguishing between products or services furnished by them to factories and those either furnished to the general public or exported. Imports likewise are distinguished as a source of materials. The contributions to the factories are repeated on the same scale in the two bars representing factory output; these bars show at the left the value of materials used (including fuel and power), and at the right the value added by the process of manufacture. Food factories are segregated from nonfood factories because of the wide differences in the relative importance of the sources of materials and in the relation between materials and value added by manufacture. The total length of the bar for nonfood factories represents from \$30,000,000,000 to \$32,000,000,000 and for food factories about \$8,000,000,000. Many of the items are estimated from partial data

to the packing plant, and a large part of his milk to the creamery. Cotton makes up a dominant share of the contribution of agriculture to the nonfood-manufacturing industries.

Comparatively little of the product of the mines is directly exported as such. About two fifths of the total, in value, goes to American consumers for use without transformation

by factories, the biggest item being coal for domestic heating, transportation power, and the generation of electric current. The greater fraction of mine output enters factories. But here the minerals serve two quite different functions: they become agents for transforming other materials or they themselves are transformed. Great quantities of coal, either as such or after conversion into coke (itself a manufacturing process), most of the natural gas, and some petroleum are used as factory fuel to generate either power or industrial heat, as for smelting metals. The value of such fuel represents about two fifths of the contribution of the mines to the factories. In the other fraction the two principal items are petroleum, which requires refining to serve its most useful purposes, and the ores of the various metals.

Most forest products are subjected to manufacture, the principal exceptions being firewood, posts, poles, mine timbers, and hewn railroad ties. Including the large output in Alaska the value of the product of American fisheries (not shown in the diagram) is about \$110,000,000 annually, and perhaps a third of this goes to factories for canning or curing.

The railways are important contributors to the value of manufactured products, apart from their service in carrying the finished goods to the final consumer. They carry raw materials to the factory and partly finished commodities from one plant to another. It is probable that the value of this service is more than a billion dollars annually.

We thus see that all the extractive industries must turn to the factory to prepare at least part of their product for final use. Conversely, the factory must depend utterly upon the extractive industries for what it is to transform. Of the twelve or thirteen billion dollars' worth of materials that enter the factories of the United States in the course of a year (not counting duplicated materials), American farms contribute between four and five tenths and American mines two tenths. About one fourth represents imported materials, either raw or in a partly manufactured state; it is evident that foreign trade is fully as important to the American manufacturing

industry from the standpoint of imports as from that of exports. The remainder of the value of factory materials consists of the contributions of the railways, the forests, and the fisheries, and of central electric stations supplying power.

Apart from fuel, the materials used by food factories are nearly all of agricultural origin. American farms supply most of them, but imported raw sugar, cocoa, and oil-bearing seeds and nuts play a very considerable part. In the case of nonfood manufactures the mines appear as the greatest single source of materials, especially when fuel is taken into account. American farms contribute heavily to the textile industries, and forests to the various wood and paper industries. Imported materials are of even greater importance here than in the case of the food manufactures.

Although the most important of the interrelations among the branches of industry have to do with the supply of materials to factories, the latter are in turn very considerable contributors to the extractive industries, to transportation, and especially to the construction industry. It has already been pointed out that a significant fraction of the gross value of output of farms, mines, railways, and various other classes of productive enterprises is paid out for supplies, machinery, and the like. Most of these payments go to the manufacturing industries. The construction industry draws from the factories nearly all the three or four billion dollars' worth of materials which it uses annually.

As against the imports of raw materials, American manufacturing industry exports a considerably greater value of factory products. Such exports, including those of semi-manufactures, constitute, however, only about 8 per cent of the total value of goods turned out.

Distribution

Intimate as are the economic ties among the several branches of industry which produce tangible goods and transport service, they are no closer than those which bind these

branches to that of marketing. Merchants buy and sell the products of the extractive industries and of the factories. They are the middlemen between producer and consumer. The term "middleman" is sometimes used as though in itself it implied some reproach, but, save in the most primitive stages of economic life, the function of distribution is as essential as any other. In the case of certain commodities it is quite possible for the original producer to sell directly to the consumer. When he does so, however, he is performing two economic functions, not one. It may or may not be an advantage to him thus to extend his field. Some American manufacturing concerns which advertise that they dispense with the middleman actually find it necessary to maintain an elaborate selling organization.

Because of the great lack of statistics regarding distribution, and also because its conduct is so intricate that any brief description is scarcely feasible, no special chapter of this book is devoted to that subject. Its importance, however, is great. The value added to commodities by the process of bringing them to the hand of the consumer runs into billions of dollars. The gross value of the transactions is some scores of billions. As in the case of manufacturing industry, there is great duplication of values. The same product may pass through two or three or perhaps half a dozen hands. Increase in the number of turnovers may in some cases enhance the cost of distribution, but often it represents an advantageous specialization of function. Ordinarily only where both producer and consumer are large concerns can sales take place economically without a specialized intermediary. The mine operator may sell coal direct to the steel manufacturer; the latter may sell steel direct to the railroad or the automobile manufacturer; but the coal mine and the steelworks cannot sell direct to the householder, nor can the automobile manufacturer advantageously deal directly with the motorist.

A major function of the middleman is to change the magnitude of transactions as between the purchase and the sale: to buy in small quantities and sell in large, or vice versa.

Wheat or cotton or hogs are bought from the farm by the merchant because the individual farmer does not have enough to justify direct dealing with the mill or the packing plant. Groceries and cloth and drugs and what-not are sold by the merchant because the individual does not want enough to justify the producer in dealing directly with him.

It is impossible, within any tolerable margin of error, to estimate what proportion of the commodities produced in this country pass through the hands of middlemen, still less to estimate the gross value of mercantile transactions, including duplication of sales. Probably more than two thirds of all commodities, apart from semifinished manufactures, are bought and sold at least once by persons other than the original producer and the final consumer, and probably at least one third are so handled more than once.

Most marketed farm products pass through at least two or three hands, even though they are subject to no manufacturing process; where they are manufactured the number of intermediate transactions is usually further increased. Mine operators are able to sell a large proportion of their output direct to big buyers, but retail sale of coal reaches huge proportions. In the case of manufacturing industry there are three major classes of transactions: (1) sales destined for larger users of finished factory products, such as railways and big construction concerns; (2) sales of partly finished products to be further elaborated by other factories; (3) sales of finished products to the general public. Transactions of the first two classes are often conducted through middlemen, but probably the greater part, measured by value, are handled without such aid. Sales to the ordinary consumer are made almost altogether through mercantile concerns, either wholly independent or, if controlled by the manufacturer, organized as virtually separate enterprises. The typical form of such distribution, indeed, involves two stages: the wholesale and the retail.

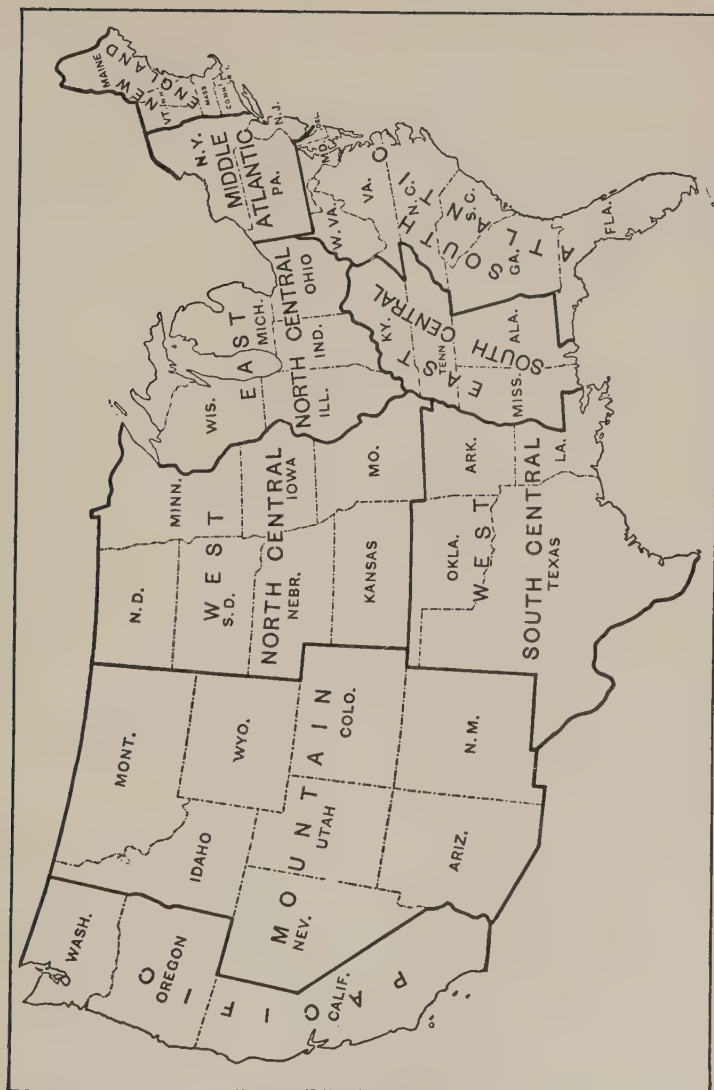
CHAPTER VII

GENERAL ECONOMIC GEOGRAPHY OF THE UNITED STATES

SECTION 1. AREA AND POPULATION OF STATES AND DIVISIONS

Statistics in the United States are commonly presented by states or by geographic divisions comprising several states (see map). In any comparison between states or divisions the great differences in area are obviously a major factor. One state, for example, may greatly outrank another in aggregate agricultural output and yet fall below in output per square mile. Texas can more than swallow all the New England states and all those which lie along the Atlantic seaboard as far south as North Carolina. California stretches as far along the Pacific as the four states from North Carolina to Florida and falls not very much short of them in area. New York is a state of only medium size, but it is six times as big as Massachusetts and more than forty times as big as Rhode Island.

In general the states become larger as one moves toward the west. Exceptionally small are the New England states (except Maine) and New Jersey, Delaware, and Maryland; none of these eight has as much as ten thousand square miles of territory. The other states east of the Mississippi are of medium size, from about twenty-five thousand square miles to about sixty thousand. Most of the states between the Mississippi and the Rockies are somewhat larger; with the exception of Texas they vary from about forty-five thousand square miles to about eighty thousand. Farther west the boundaries expand still more: the Mountain and Pacific states (except Washington) all exceed eighty thousand square miles, and a majority of them exceed a hundred thousand.



GEOGRAPHIC DIVISIONS OF THE UNITED STATES

The tendency for the states to become larger toward the west is partly due to historical causes. As population pushed out from the original colonies along the seaboard, thinly settled areas demanded statehood. The older states, in view of the equal representation in the Senate, had no disposition to admit as a state an area of unduly small population. The people of a state once organized seldom wish to see it divided later on, however much its population may multiply. The fact that some of the big Western states have still only a small population is partly due to the relative paucity of their resources, which results chiefly from lack of sufficient rainfall.

The distribution of population is a basic economic phenomenon. It indicates in a general way the position of the states in the production of wealth. Dense population reflects large output per unit of area. The accompanying map (page 310) and Fig. 37 show the distribution of population in 1920; the picture for the present time would be somewhat different. The map indicates merely the standing of the states as such and not the distribution of inhabitants within their borders. In many cases — even apart from the unevenness caused by the presence of a large city — marked variations in density of population appear in different parts of a single state; for example, the distribution of population within the states immediately to the east of the Rocky Mountains sharply reflects the superior fertility of their eastern counties as compared with the western.

Broadly speaking, the population becomes less dense as one moves from east to west or from north to south. The most conspicuous exceptions are the sparseness of settlement in the rough areas in the northern parts of Maine, New York, Michigan, Wisconsin, and Minnesota, and the relatively dense population of the southern Pacific coast. The four most populous states — New York, Pennsylvania, Illinois, and Ohio — are all of moderate area; they owe their leadership chiefly to the high development of the manufacturing industry. Texas, though far less densely peopled, is brought into the next rank by its vast size. Then follow Michigan,

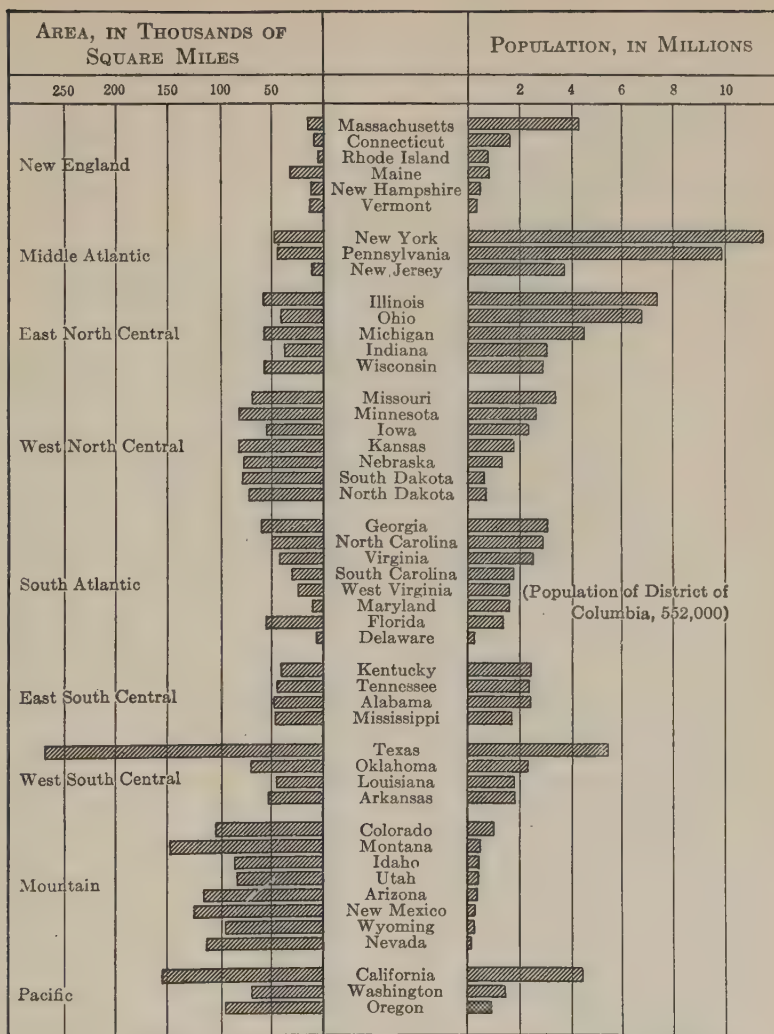
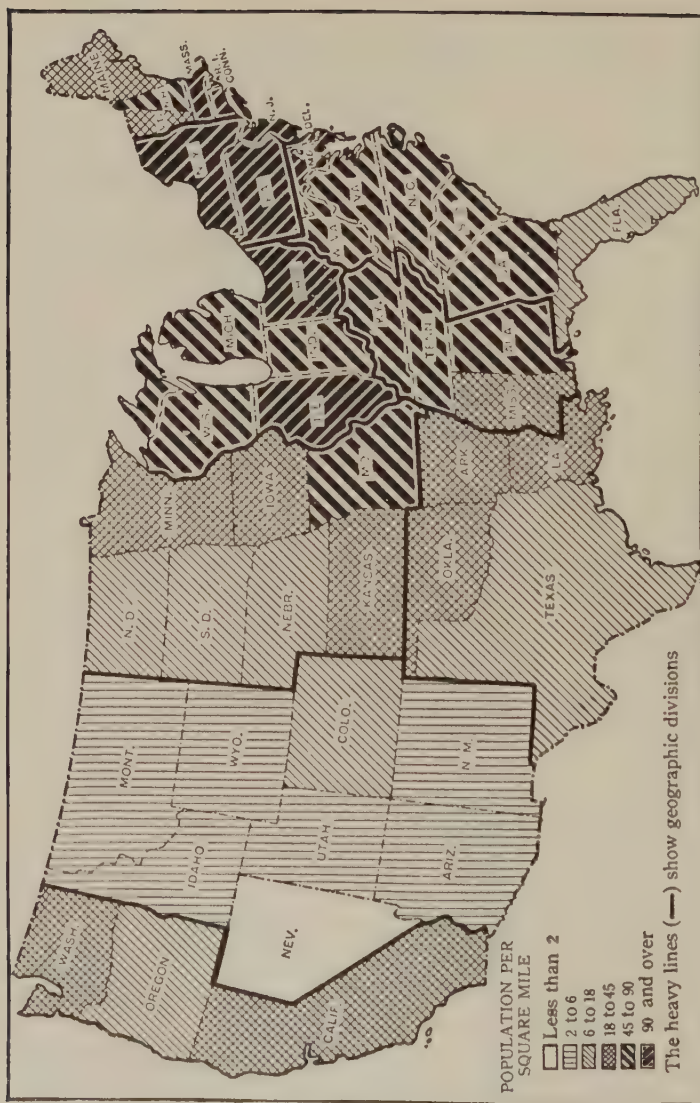


FIG. 37. Diagram showing the area and population of the several states (estimates for 1928)

The bars are so arranged that if the state had a density of population of forty per square mile (approximately the United States average in 1928), the two would be of equal length. Considerable changes have taken place since the last actual census, in 1920, certain states growing much faster than others; and the estimates may in some cases be subject to considerable error



POPULATION PER SQUARE MILE BY STATES, 1920

swiftly expanding in industry, big California, and little Massachusetts, with its intensive development of manufactures and of commerce.

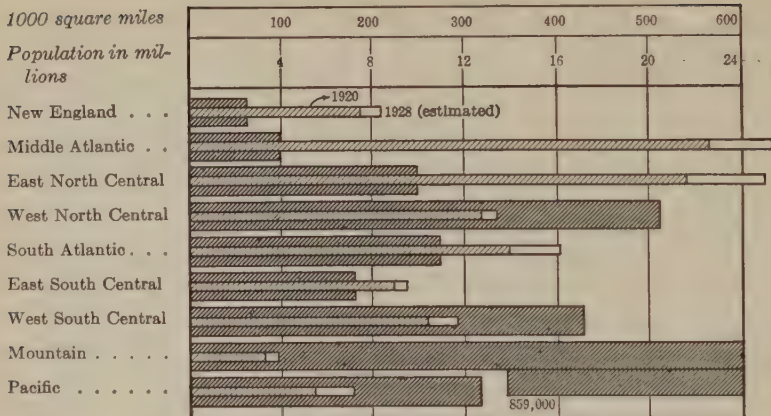
The density of population is greatest in four states of very small area: Rhode Island, Massachusetts, New Jersey (with its proximity to New York City), and Connecticut. Among the larger states the lead falls easily to New York and Pennsylvania, with two hundred and eighteen and one hundred and ninety-four persons per square mile, respectively, in 1920. Even these states are less thickly peopled than several of the countries of Europe. A number of the states in the South and in the central sections of the country occupy an intermediate position, with population ranging from about forty per square mile to about sixty, but the development of manufactures in Illinois, Ohio, Indiana, and Michigan has brought their density up well above these figures. None of the eight states of the Mountain division had as many as ten persons per square mile in 1920, and in several the density fell below five. Although the population has become fairly dense in a rather narrow strip along the coast, the Pacific states still stand far below the national average.

A more condensed view of the distribution of population is presented by Fig. 38, *A* and *B*, which relates to the nine geographic divisions distinguished by the government statistical bureaus. The diagram shows, for example, that the Mountain division, with over eight times the area of the Middle Atlantic, has less than one sixth as many inhabitants. In the former there are on the average only four persons per square mile; in the latter, more than two hundred and twenty (1920 data).

Growth of Population; its Future Distribution

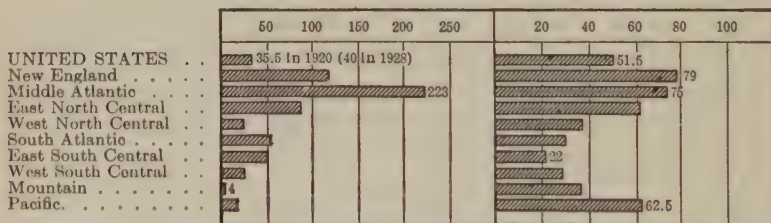
To what extent are these wide differences in density of population due merely to the fact that the country is new, and that settlement, beginning in the East and gradually pushing westward, has not reached its normal status? To

A. AREA AND POPULATION: ABSOLUTE FIGURES



B. POPULATION PER SQUARE MILE, 1920

C. PERCENTAGE OF URBAN POPULATION, 1920



D. RELATIVE URBAN POPULATION IN 1920 (1900 TAKEN AS 100)

E. RELATIVE RURAL POPULATION

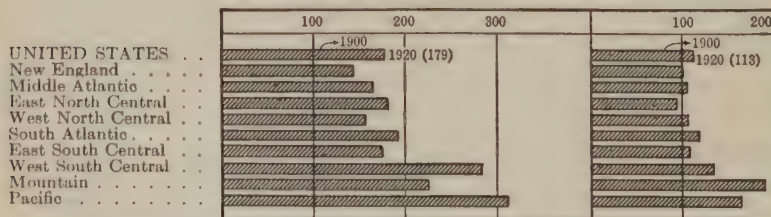


FIG. 38. Diagram relating to the population of the geographic divisions

Section A shows both the population as enumerated in 1920 and as estimated for 1928; the bars are so arranged that with a density of forty per square mile the two would be of equal length. The broad bar shows area on the basis of the upper scale; the narrow bar shows population. Sections D and E present relative numbers; thus in 1920 the urban population was 178 per cent of the number in 1900

what extent do they reflect fundamental differences in natural resources and in the ability to support population? Certain it is that they cannot be attributed, as can differences between some of the countries of the world, to variations in the character and productive capacity of the people themselves. The history of the past growth of population in the United States throws some light upon probable future tendencies.

The distribution of population is closely tied up with that of agriculture and of manufactures. Mining and forestry employ only small numbers, and workers in transportation, marketing, personal service, and the professions naturally group themselves round those in the more basic occupations. During the early history of the United States the relative growth of different sections was chiefly determined by the opening up of agricultural lands. Later on, the same force continued to work strongly, but the development of factories also played a large part.¹ In the last three decades the growth of manufactures has been the controlling factor; for, as we have seen, there has been no expansion in the total agricultural population.

The movements of population resultant from these changing forces are seen from Fig. 39, A, which shows the growth between 1860 and 1920. Naturally the Mountain and Pacific divisions, originally almost empty, show the highest percentages of increase, but only since 1900 has the addition to their population, in absolute numbers, been comparable with that in the older sections. From 1860 to 1880 the two divisions which gained most, in absolute terms, are the East North Central and the West North Central, the latter nearly trebling in population. This growth was mainly a reflection of the opening of new farm lands, although the East North Central states were already becoming in some measure industrialized. From 1880 to 1900 the West North Central still led most of the divisions in rate of growth; but the

¹ For further discussion of these points see Chapter II.

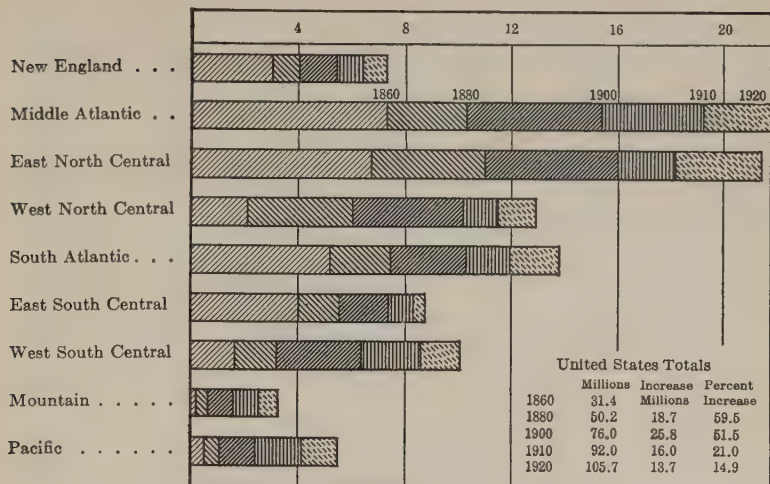
difference was much less marked than before, and in absolute numbers the Middle Atlantic and East North Central divisions (mainly by reason of the development of factories) added decidedly more inhabitants than did their neighbor to the west. Growth in the West South Central region was conspicuous during this period and was chiefly the result of the opening of new farm lands; theretofore it had lagged behind the more northerly prairie section.

The period from 1900 to 1920 presents a very different picture, and the tendencies then shown are still continuing. The increase of population in the agricultural West North Central division was slower than in any other save the East South Central, itself also primarily a farming section. The rapid growth of the West South Central, Mountain, and Pacific divisions was only in part due to agricultural development. In large measure it reflected swift strides in mining and in factory industries. Far the greatest absolute gains appeared in the two leading manufacturing sections, the Middle Atlantic and the East North Central. The former added most to its population between 1900 and 1910, and the latter most during the ensuing decade, when it showed a higher percentage of increase than any other except the two Far Western sections. Conspicuous, too, was the advance between 1900 and 1920 in certain states of the South Atlantic region, again due chiefly to the growth of mining and manufactures. The Pacific division, however, led all others by a considerable margin in the relative increase of population, multiplying its numbers two and a third times. Even the absolute addition was very great, — over three million.

As is more fully pointed out elsewhere,¹ the distribution of farming activity over the United States is not likely to change very greatly in the future. Changes in the distribution of population will result mainly from changes which may occur in manufacturing industry. The prospects in this respect are discussed in Chapter X. Ultimately factories will

¹ Chapter VIII, Section 5.

A. ABSOLUTE NUMBER OF INHABITANTS, IN MILLIONS



B. PERCENTAGES OF POPULATION GROWTH

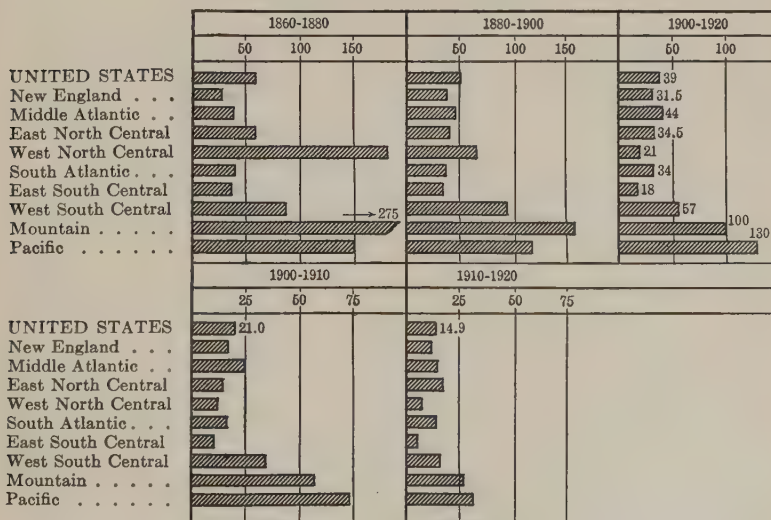


FIG. 39. Growth of population of the several divisions from 1860 to 1920

In section A each bar represents the population at each of five censuses. For example, the second bar shows that the population of the Middle Atlantic division in 1860 was about 7,450,000, in 1880 about 10,500,000, and in 1920 about 22,500,000. Section B shows the percentages of increase by periods of twenty or ten years (note that these are not relative numbers as in the case of Fig. 38)

place themselves in accordance with the relative advantages that are offered by each section or locality as to power, materials, markets, and eligibility as a place of abode. The dominance of the northeastern region in manufactures and in population is in part due to superiority in these respects, but only in part: it is in considerable measure attributable to having a first start. This good fortune will continue to aid that region, but with gradually diminishing force. In time population will become somewhat more evenly distributed, though differences in natural resources will always prevent any close approach to uniform density.

Urban and Rural Population

In those sections where population is dense a large proportion of the people live in cities. This is chiefly because of the dominance of factory industry, which tends to concentrate in urban communities. In several of the sparsely settled Western states the proportion of urban population is also fairly high because agricultural resources are limited, and mining, with its attendant manufacturing enterprises, is a major factor. In the United States as a whole over half the population is classed as urban.¹ In 1920 the proportion was 51½ per cent; by 1930 it will probably reach over 55 per cent. Wide differences appear between the states, the ratio ranging in 1920 from 95 per cent or more in Massachusetts and Rhode Island and 83 per cent in New York to less than 20 per cent in such states as the two Dakotas, South Carolina, Arkansas, and Mississippi. In New England as a whole about four fifths of the people are counted as urban; the ratio is about three fourths in the Middle Atlantic division and five eighths in the East North Central and Pacific divisions; in the three divisions of the South and in the West North Cen-

¹ The Census Bureau classes as urban incorporated places of twenty-five hundred or more inhabitants and certain New England unincorporated communities, and designates all other communities as rural. On this basis rural population is, of course, by no means identical with agricultural population, the latter being materially smaller.

tral and Mountain divisions it ranges from about 22 to 38 per cent (see Fig. 38). The expansion of manufactures between 1900 and 1920 is indicated by a marked advance in the proportion of urban dwellers in every section. In a majority of the states practically the entire gain in population in the last twenty-five years has been in towns. Outside of the West South Central, Mountain, and Pacific divisions, "rural" population increased only 6 per cent between 1900 and 1920, whereas that classed as urban increased 69 per cent. If towns and villages of less than twenty-five hundred inhabitants were classed as urban rather than as rural, the increase in rural dwellers in this great part of the country would almost disappear.

Composition of the Population

The composition of the population with respect to race, nativity, and sex has important relations, both of cause and of effect, to the character of the industries of a given section of the country. There are marked variations between states and divisions in the make-up of their inhabitants. The Negroes are confined substantially to the South. In the South Atlantic division they constitute 31 per cent of the population, in the East South Central $28\frac{1}{2}$ per cent, and in the West South Central 20 per cent (1920 figures). The fact that the South is still primarily an agricultural region is probably due in some part to the preference of the Negro for farm work. The foreign stock -- persons born abroad or one or both of whose parents were born abroad -- is also very unequally distributed. There are very few of such stock in the South because the demand for farm labor is filled by the Negro and because factories are as yet less developed than in the North. The foreign element, moreover, decreases as one moves from east to west. In New England three fifths of the population in 1920 consisted either of the foreign-born or of their immediate descendants; in the Middle Atlantic division the proportion was well over half. In the West North Central and Mountain divisions it fell to three eighths. The East North

Central and Pacific divisions occupy an intermediate position among those of the North and the West in this respect.

The foreign element is thus strongest where the density of total population is highest and where manufacturing is most developed. The explanation lies not chiefly in the preference of the immigrants for the city and the factory. Apart from a few nationalities no such preference appears to exist; indeed, most of the immigrants came from farm homes in the Old World. The principal reason why the foreign stock is thus distributed is found in the fact that the country has for a long time demanded more industrial workers rather than more farm workers. Agricultural population has been stationary. Since 1900 very few of the millions arriving from foreign shores have found the soil beckoning for their labor. In the meantime the descendants of the earlier immigrants, many of whom did go into agriculture, are reckoned statistically with the native stock. Now that immigration is closely restricted, it will not be many decades before the "foreign stock" will become a small proportion of the population in all sections of the country, and the process of assimilation will gradually bring about a large measure of uniformity in the type of the white population.

The proportion of males in the population is somewhat higher in the western parts of the country than in the eastern. The factories and offices of the East offer more opportunity for employment for women than do the farms, forests, and mines of the West. Newly settled regions the world over almost always show an excess of men over women. For every 100 females the New England division has 98 males, and the Mountain division 116. The excess of males over females in the Far Western states is, however, rapidly diminishing.

Even among primarily industrial and commercial states some difference in the ratio of the sexes appears by reason of differences in the prevailing type of industries. Thus in Michigan, where the automobile industry, with relatively few female employees, dominates, there are as many as 111 males to 100 females.

SECTION 2. GEOGRAPHICAL DISTRIBUTION OF OCCUPATIONS

The general geographical distribution of the great branches of economic activity in the United States is familiar to all: the concentration of manufactures in the northeastern section, the dominance of the Mississippi Valley in agriculture, the somewhat scattered localization of mining. It is worth while, however, to attempt to make this picture somewhat more definite.

There are no statistics of occupations later than 1920, and considerable changes have taken place since that time in the country as a whole and still more in certain regions (see Chapter II, Section 7, and Chapter VI, Sections 2 and 4); nevertheless a fairly satisfactory view of the work of the population of the several geographic divisions may be gained from the data for that year. Fig. 40 relates to occupations of men only. It is difficult for census enumerators to make a sharp distinction between the women "gainfully occupied" in the official statistical sense and those who are not, and the difficulty is greater in some sections than in others, so that the inclusion of figures for women would tend somewhat to obscure the picture of the work of the people.¹ Were women included, the proportion engaged in clerical work would, in all divisions, appear larger than in the diagram, and the same would be true of professional and domestic services. The inclusion of women would also raise the proportion for the manufacturing and mechanical group in the case of the leading industrial regions, but this would not hold true of the Southern divisions, where many women, chiefly Negroes, are reported as engaged in agriculture.

In each of the three divisions of the Northeast the manufacturing and mechanical industries claim far more workers

¹ For example, a great many Negro women in the South are reported as engaged in agriculture. They do a great deal of outdoor farm work, but it may hardly be comparable in duration, taking the year as a whole, with that done by men. Moreover, it may contribute little more to actual output of agriculture than does the work of many women on farms elsewhere who are not reported as gainfully occupied (see, further, Chapter VI, Section 3).

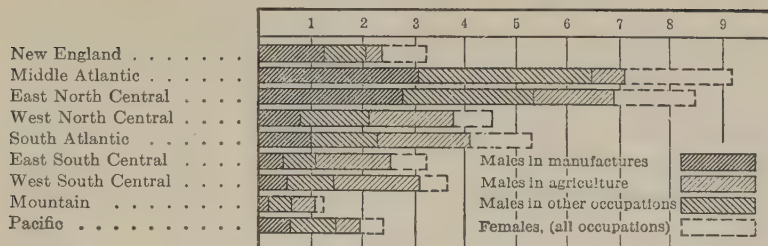
than the farms, although in the East North Central division agriculture is of great importance. In New England over half the total number of males fall into the factory group. When the Mississippi is crossed, the aspect of economic life changes. In the West North Central and Rocky Mountain divisions about twice as many men work on farms and in forests as in factories. Even more strikingly do agricultural occupations dominate in most of the Southern states, though along the South Atlantic, where factory industry is rapidly developing, the disproportion is much less marked. On the Pacific slope the recent progress of manufactures, together with the large volume of construction incident to the swift growth of population, has brought the number of workers in manufacturing and mechanical pursuits to a point considerably above that of farm and forest workers.

In the diagram the clerical workers have been placed between the manufacturing group and the trade group, since in fact a large majority of them are associated with one or the other of these two classes. The proportion of such workers (the same is true of women as of men) is much larger in the industrial sections than elsewhere. It is highest in the Middle Atlantic division; the towering offices of the great cities house hundreds of thousands of clerical workers.

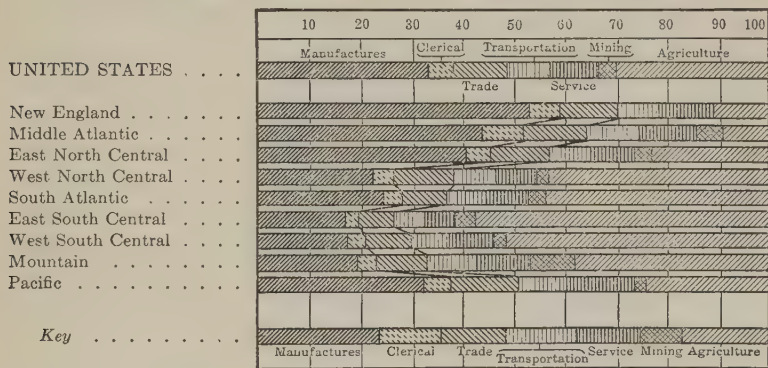
The relative importance of the mining industry as a producer of wealth does not, in the case of some sections, appear from the number of workers engaged in it. Notably in the petroleum industry the value of output per person employed is much higher than in most fields of production. In the West South Central division especially, the number of mine workers is not large, but mineral output, chiefly oil, accounts for a big fraction of the total value created by all industries. The proportion employed in extracting underground wealth is high in the Mountain division, reaching $8\frac{1}{2}$ per cent of the total number of gainfully occupied males.

Workers in the fields of transport and merchandising and in the professional, governmental, and so-called "personal" services are distributed over the country in rough parallel

A. PERSONS GAINFULLY OCCUPIED, IN MILLIONS



B. PERCENTAGE DISTRIBUTION OF MALES GAINFULLY OCCUPIED



C. PERCENTAGE OF TOTAL MALES IN EACH GROUP

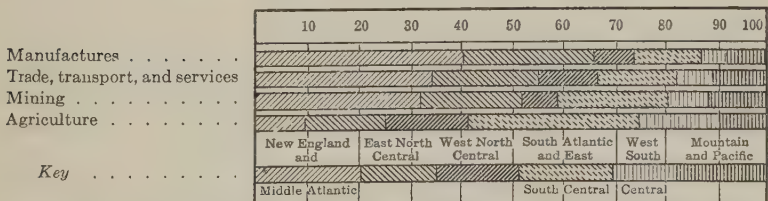


FIG. 40. Diagram showing the occupations of the male population of the several divisions in 1920

There have been very considerable changes in occupations since 1920, but data for the present time are not available. The diagram (save the general total for females in section A) relates to males only. In section A, which presents absolute numbers, the five smaller occupation groups are thrown together. Section B shows the percentage distribution of the total number of occupied males in each division among the several groups. Conversely, section C shows for each of four major groups the proportion falling to the several geographic divisions; for example, of those engaged in manufactures a little over 40 per cent are in the New England and Middle Atlantic divisions

with the total number of inhabitants. Whatever the rest of the community may be doing for a living, it must have such services. The proportion which these groups form of the total number of workers therefore varies from section to section only within moderate limits. There is a certain tendency for these occupations to associate themselves with dense population and high development of factory industry. The proportion employed in them is consequently somewhat lower in the South than elsewhere. On the other hand, it is fully as high on the Pacific coast as in the northeastern part of the country. Here, indeed, the proportion engaged in trade reaches its maximum, with the wealthy consuming population of the coast, its large foreign trade, its swarming real-estate agents, and the other activities that go with rapidly growing population. The relative number in mercantile pursuits is next highest in the Middle Atlantic division, the seat of the world's commercial metropolis. The fact that the mercantile class is proportionately larger in the agricultural regions of the North than in the South is perhaps explained by the greater buying power of the Northern farmer.

The proportion engaged in transportation is markedly uniform because, on the one hand, in thickly populated regions industrial production is high and the traffic consequently dense, and, on the other hand, in the regions where population is sparse so much long-distance traffic must pass on its way between more populous centers that relatively large numbers of transport workers are required. It is not surprising that the Mountain, Pacific, and Middle Atlantic divisions stand almost shoulder to shoulder in the ratio of transport employees to the total number of males in all occupations.

Fig. 40, C, shows what proportion of the male workers in the principal groups of occupations live in different parts of the country. New England and the Middle Atlantic division are grouped together as being more or less alike in the nature of their industries, and the South Atlantic and East

South Central divisions are similarly paired, as well as the Mountain and Pacific divisions. The three divisions of the Northeast accounted in 1920 for not quite half the total population of the country, but they had two thirds of its (male) workers in the manufacturing and mechanical industries. The three Southern divisions, with about three tenths of the total number of inhabitants, reported nearly half of all the farm workers, and the West North Central division, with less than one eighth of the population, had one sixth of the total number of men engaged in agriculture.

SECTION 3. FARM, MINE, AND FACTORY OUTPUT BY DIVISIONS AND STATES

Geographic Divisions

Statistics of the value of the output of farms, mines, and factories in the several sections are not only useful as showing the character of their economic life, but also serve to indicate, at least roughly, how they compare with one another as to the total income of the people. Agriculture, mining, and manufactures, taken together, account for much more than half of the total value of output in all parts of the country, and the proportion which they contribute varies only within moderate limits from section to section.¹

In combined value of its agricultural, mineral, and manufactured products the East North Central division leads all

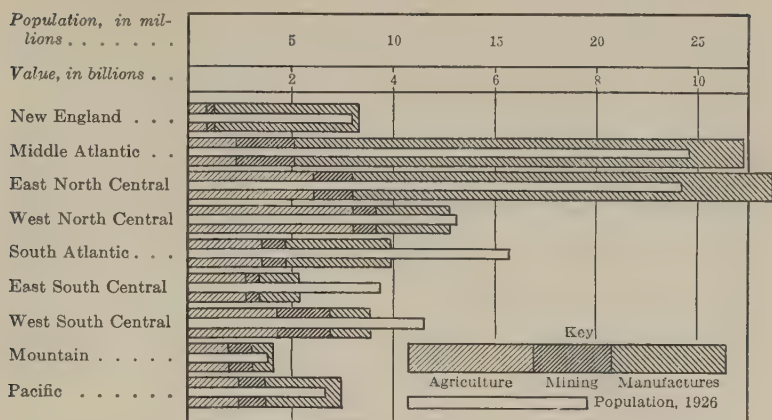
¹ It has already been pointed out that the reported figures of value of farm products (duplications excluded) probably somewhat understate the true total, thus tending to give agriculture less than its proper standing as compared with manufactures and mining. It might be thought that on this account the combined totals for the three branches would tend to underrate the true economic rank of those states or sections where agriculture is the dominant industry. This is probably not the case, however, for the reason that the industrial states have relatively more workers in commerce and miscellaneous services than the agricultural states.

The elimination of duplication in the value of farm products of the several divisions is based on approximate estimate by the present writer, and the net figures are subject to a certain, though not very large, margin of error (on this point see also Chapter VIII, Section 5).

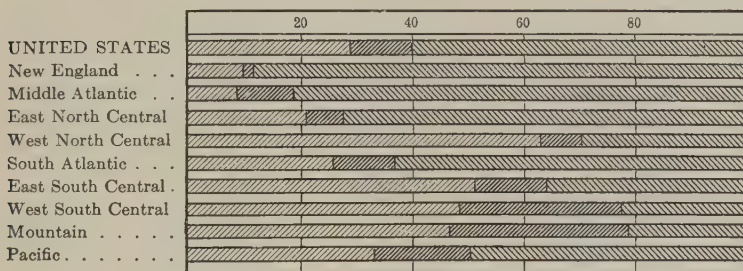
the others, although it surpasses the Middle Atlantic only slightly. These two divisions together account for practically half the aggregate for the country as a whole, although they have only about 42 per cent of the total population. In the three Southern divisions, on the other hand, are found 31 per cent of the inhabitants of the United States, but they produce less than 22 per cent of the reported total output of farms, mines, and factories. This disparity is partly due to the fact that the South is predominantly agricultural, and partly to the lower scale of wages and the lower average value of output per worker in Southern factories and especially in Southern agriculture.

Wide differences appear in the relation between value of products and area, roughly corresponding to the differences in the density of the population. For each square mile of its territory the Middle Atlantic division produces about \$110,000 worth of farm, mine, and factory products, and this despite the fact that it contains large areas of mountainous or rough lands which produce but little. This average, which is twice as high as for any other section, reflects the heavy concentration of manufactures. New England and the East North Central division rank next in this respect, with average values in the neighborhood of \$50,000 per square mile. The averages elsewhere are far lower, ranging from less than \$2000 in the Mountain division to about \$15,000 in the South Atlantic (see Fig. 41, C). Section *D* of the diagram shows the combined value of agricultural, mineral, and manufactured products per capita of the population of each division. These averages have no little significance despite the fact that the proportion of the population engaged in these branches, taken together, varies somewhat. Comparatively little difference in the per capita figures appears between the six divisions of the North and the West, the range being only from about \$390 in the West North Central division to about \$475 in the East North Central. Lower averages are found in the case of the two divisions of the South which lie east of the Mississippi. The value

A. ABSOLUTE VALUE OF FARM, MINE, AND FACTORY OUTPUT



B. PERCENTAGE OF THE COMBINED VALUE OF THE THREE GROUPS



C. COMBINED VALUE PER SQUARE MILE IN THOUSANDS

D. COMBINED VALUE PER CAPITA IN DOLLARS

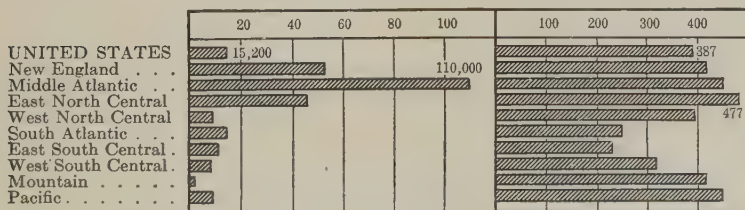


FIG. 41. Diagram showing the value of output of farms, mines, and factories

The figures for farms are means of 1925 and 1926; for mines, means of 1925 to 1927; for factories, means of 1925 and 1927; for population, 1926 (estimate). They involve estimates, especially as to farm products (see text). The value of farm products excludes duplication from the feeding of crops to animals; the value for factories represents the addition to cost of materials by manufacturing processes

of their farm, mine, and factory output ranges from about \$230 per capita of their population to \$250. Owing partly to its rich petroleum fields, the West South Central division occupies a somewhat higher position in this respect.

The shares contributed by the three branches of industry individually to the combined total value of output present a wide range in the different parts of the country (Fig. 41, *B*). The teeming factories of the New England and Middle Atlantic divisions turn out a value eight or nine times that of the farms. Despite the fact that the East North Central division is a leader in agriculture, the value of its factory output is about three and a half times the net value of its farm products. On the other hand, in the division adjoining on the west, across the Mississippi, agriculture contributes considerably more than twice as much as manufacturing industry, and the same is true of the West South Central and Mountain divisions. The East South Central division also shows for farms an output far larger than that of factories. The manufactures of the South Atlantic states and of the Pacific states alike have recently forged very much ahead of the agricultural products in value.

In most sections mines account for a relatively small fraction of the income of the people. Pennsylvania's vast coal fields bring the mineral output of the Middle Atlantic division above that of the farms, but even so it is only one tenth of the combined value produced by the three major branches under consideration. In the Southwest and the Far West, however, mines and oil wells contribute from one sixth to one third of the combined total. Indeed, in two of these divisions — the West South Central and the Mountain — the value of mineral output largely exceeds that produced by the factories.

Subsequent chapters compare the position of the several sections of the country in each of the major branches of industry. It is sufficient here merely to mention (on the basis of the data shown in Fig. 41, *A*) the leadership of the three northeastern divisions in manufactures, of the two North Central and the three Southern divisions in agriculture, and

of the Middle Atlantic and West South Central divisions in mining. The diagram shows that, as might be expected, the manufacturing industry is more unequally distributed than agriculture. The Middle Atlantic division, ranking first in manufactures, has over twenty-five times as great a value of factory output as the Mountain division, which stands at the bottom. If we leave New England, with its very small area, out of the comparison, the West North Central division, which leads in farming, has only four times as great a value of agricultural products as the division ranking lowest, which again is the Mountain division.

States

No attempt is here made to present for individual states a combined net total of the value of manufactured, mineral, and agricultural products such as that presented for the geographical divisions, because at the time this volume was written no adequate data existed by which to estimate the duplication in the value of farm products by states. In Fig. 42 the values of crops and of animal products are shown separately; the net value, exclusive of duplication, lies, of course, somewhere between that for crops and the gross total.¹

The states within each geographical division are arranged in the diagram according to the approximate order of the combined value of agricultural, mineral, and manufactured products. In most cases, very naturally, this order is the same as the order in population. Notable exceptions appear in the South Atlantic division, where North Carolina, West Virginia, and Maryland, on account of the importance of their manufacturing and mining activities, rank higher in value of products than in number of inhabitants. In the Mountain division there are several states which differ relatively little from one another in population or in value of products.

¹ While this book was in press the United States Department of Agriculture (in *Crops and Markets*, September, 1929) made public estimates of the net value of farm products for each state for a number of recent years. In the text, account has been taken of these data, but the diagram could not be revised.

BILLIONS OF DOLLARS

BILLIONS OF DOLLARS

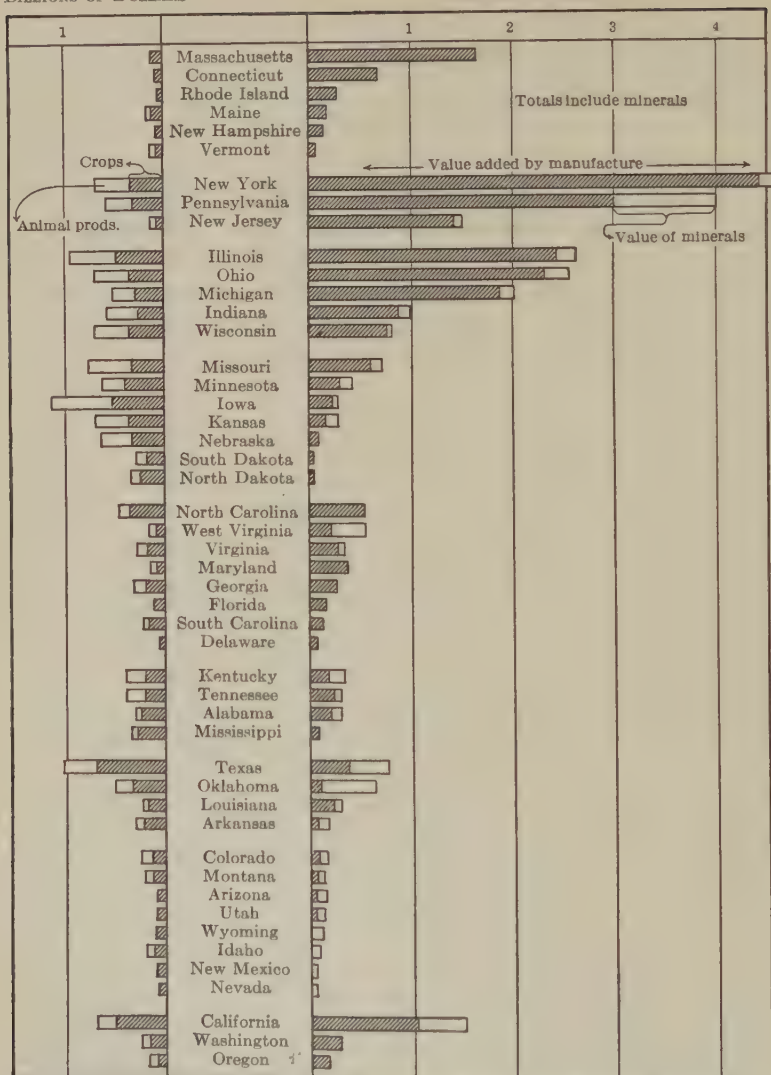


FIG. 42. Diagram showing the values of mineral products, manufactures, crops, and animal products of farms in each state

The figures relate to the same years as for Fig. 41. The duplication in the value of farm products due to the feeding of crops to animals is not eliminated. In some cases the values are so small that they cannot be shown separately, but are consolidated with the adjacent section of the bar

The states with the greatest combined value of agricultural, mineral, and manufactured products are, in order: New York, Pennsylvania, Illinois, Ohio, Michigan, California, Massachusetts, New Jersey, Texas, Indiana, Wisconsin, Missouri and Iowa.¹ These states occupy the same order in number of inhabitants, except that Texas is the fifth state of the Union in population and that Missouri outranks Indiana and Wisconsin in this respect. There are two or three states which rank above some of those just mentioned in population but fall below in value of products.

In every state lying east of the Mississippi and north of the Ohio and Potomac rivers the value of manufactured products exceeds that of agricultural products, and in most of them the lead of the factories is very wide. On the other hand, the farms take the leading position in value of output (even after allowing for duplication of products) in all states of the West North Central division except Missouri, with its great manufacturing city St. Louis; in all the Mountain states except Arizona, Utah, Wyoming, and Nevada; and in about half the states of the South, although in Maryland, West Virginia, and North Carolina the factories greatly surpass the farms. Mining (including quarrying), which is dependent upon the accidents of nature, is of insignificant importance in a number of the states, but rises to a high position in several others.² The mines of Pennsylvania have an output not far from three times as great in value as the farms. In West Virginia, with its remarkable coal deposits, in Oklahoma, with its world leadership in petroleum, and in several of the Mountain states, where aridity sets limits to agriculture, the underground riches are the greatest single source of income. This is not true of California, though that state ranks third in the Union with respect to value of minerals.

¹ This order takes into account an approximate adjustment of agricultural products to eliminate duplication.

² All the states, of course, have some mineral output, but for a considerable number it is impossible to show it in a diagram on a small scale such as is here presented.

SECTION 4. ECONOMIC CHARACTERISTICS OF THE SEVERAL GEOGRAPHIC DIVISIONS

The data above set forth furnish a basis for a characterization of the economic life of the great sections of the country. To keep within our bounds the picture must necessarily be one of broad masses and high lights. The chapters on agriculture, mining, and manufactures fill it in with more detail.

The North

What is commonly considered the North extends from the Atlantic to the Rockies and is bounded on the south by the Potomac and Ohio rivers and the southern boundaries of Missouri and Kansas (the Census Bureau, however, classes Maryland and Delaware with the South Atlantic states). East of the Mississippi it comprises, according to the customary grouping, three divisions, all highly advanced in industry, and west of that river one division, primarily agricultural. The North embraces less than one third of the area, but has about three fifths of the population, of the country.

New England

The six states lying farthest to the northeast constitute the smallest of the divisions in area. Three of them are very densely peopled, but those to the north have relatively sparse population. Broken by many mountains and hills, with much stony land and not a little swampy land, all but lacking in mineral resources, New England is largely dependent on food-stuffs and materials from outside its borders. Its position within the Union is very similar to that of Old England in relation to the world at large. But Yankee enterprise has triumphed in remarkable measure over natural obstacles. Back in the colonial days New England became the leader in fisheries and in foreign trade. In the early years of the Republic it followed hard on the heels of Old England in bringing about and profiting by the Industrial Revolution, becoming

the major center of the textile industry and of several other branches of manufacture. The section was thus able to grow in population, drawing to itself multitudes of immigrants from abroad, at the same time that many of its native sons became pioneers of progress in the new regions of the West.

New England devotes relatively more of its workers to manufacturing industry than does any other geographic division. The farms are largely given over to specialties: to potatoes, dairy and poultry products, vegetables and fruits, and (in limited areas) tobacco. Factories and mechanical pursuits claim five out of nine of the male working population. Apart from the paper mills of the Northern forests the manufactures are mainly of the "light" order, such as require only moderate use of power and handle materials of comparatively large value for a given bulk and weight. The variety of products is very wide, but textiles stand in front. The ports of New England are the leaders in American fisheries, and they still have a large foreign trade, though here they have yielded the palm to New York and other ports which give readier access to the interior.

The Middle Atlantic Division

The states of New York, New Jersey, and Pennsylvania together occupy only a little over 3 per cent of the area of the Union, but they account for more than one fifth of its inhabitants. Seat of the world's metropolis and of other great cities, the division has a denser population than any other in the United States, though it still falls much below the industrial countries of western Europe. A considerable fraction of its area is too rough for agriculture; but it has a good deal of cultivated land, including some of very high quality, and much excellent pasture. The farms specialize largely in perishable products that supply the urban centers: milk, eggs, fruit, and truck crops.

Manufacturing is by far the dominant industry of this section. Aided by much water power, possessing the richest

coal fields of the country, and with splendid transportation facilities by water and by land, it has become the greatest center of American factory industry. The manufactures are more varied than those of any other division, ranging from the lightest forms to the heaviest. The close-packed city of New York, although it far outranks any other in America in factory output, is unfitted for industries requiring great space, bulky materials, and immense power. The Pittsburgh district, on the other hand, is the capital of the world's heavy steel industry. Between these extremes multitudes of branches of manufacture find their seat in the Middle Atlantic states.

What most distinguishes this division, however, is its immense commerce and its dominance in national and world finance and in business control. New York's foreign commerce surpasses that of any other port in the world. A vast value of domestic goods also passes through this and other cities of the division from and to all parts of the country. New England textiles, for example, are largely marketed from New York City. The position of the metropolis in finance is indicated by the fact that the value of bank checks paid in a day is considerably greater there than in all the rest of the country put together. A majority of the great corporations which produce so large a share of the national output of goods and services, and whose operations spread over the country and into foreign lands, have their head offices in the skyscrapers of Manhattan.

The East North Central Division

The East North Central division, although ranking close to the Middle Atlantic in manufacturing, is also strong in agriculture, surpassing in value of farm products all other divisions except the much more extensive West North Central. The combined value of its agricultural, mineral, and manufactured output slightly exceeds that of the Middle Atlantic division and is more than double that of the West North Central,

which ranks third in this respect. With the rapid recent development of its factories this group of states bids fair to maintain this high position in American economic life indefinitely. Its population is growing with exceptional pace.

Except the northern parts of Michigan and Wisconsin most of this region is of fertile soil, level, easily cultivated, and well watered. The crops raised include, in well-balanced proportions, substantially all those that are characteristic of the north temperate zone; corn stands at the top of the list. The division ranks very high in animal husbandry, being a great producer both of meats and of dairy products.

Abundance of coal makes power cheap in the East North Central division. The Great Lakes, finest of all internal waterways, together with the great network of railways, give easy access to materials and markets throughout the interior. It is natural that with these advantages the division should be the first to profit in a large way by the pushing outward of manufacturing industry from its original seats along the North Atlantic. Chicago, with its strategic situation at the foot of Lake Michigan and in the center of the world's richest agricultural region, has long been the second city of the country.

The manufactures of the division are scarcely less varied than those of the states farther east. Except for textiles and paper all great groups of factory industry are strongly represented. In heavy steel products this division rivals the Middle Atlantic; in the highly elaborated products of steel, notably machinery and vehicles, it stands ahead of all other sections. More than nine tenths of all American automobiles are made here.

The West North Central Division

The prairie—rich, level, vast—is the characteristic feature of the Northern states between the Mississippi and the Rockies. The prairie has made them the great granary and the great feed-lot of the nation.

Apart from the swamps and rough lands of northern Minnesota and the poorly watered plains west of the hundredth meridian, the division is remarkably well adapted for agriculture. It shares with the East North Central the splendid Corn Belt; it reigns supreme in wheat. It contributes one fourth of the total value of American farm products, and it supplies at least one third of all the meat. Owing to its distance from markets the more perishable commodities play relatively less part in the agriculture of this section than of those farther east. With the exception of the Mountain and Pacific divisions, which are far less important in agriculture, the West North Central leads all other sections in the average value of farm products per worker on the farms. The dominance of farming in the division has, however, caused the recent growth of population to fall much behind that of most of the country.

This section is less richly endowed with minerals than most others, although Minnesota's iron mines, which supply material for the industry of states farther east rather than for that of the West North Central region itself, are the richest in the world. As yet manufactures are largely confined to the transformation of local raw materials, especially foodstuffs, and to branches which by their nature are tied to the locality where the products are consumed. The future is likely, however, to see much larger development of factory industry.

The South

The economic life of the South is less varied than that of the North. If we lop off a few corners — Maryland, West Virginia, Florida, western Texas, and western Oklahoma — we shall find a density of population much more nearly uniform than in the northern part of the country. We shall find too that throughout this area the agricultural population much outnumbers the industrial, and that the farm popula-

tion itself is decidedly more dense than in the typical farming regions of the North. The three Southern divisions (each considered as a whole and disregarding variations among their individual states) possess several aspects in common which are not characteristic of any other section; namely, the small number of inhabitants of foreign stock, the relatively high proportion of Negroes, the marked dominance of crop-raising over animal husbandry, and the equally marked dominance of cotton among crops. In certain other aspects, however, these divisions differ rather sharply from one another.

The South as a whole has a little less than three tenths of the area of the United States and a little more than three tenths of the population, but its share in the aggregate production of wealth is lower. This results partly from the dominance of agriculture, which everywhere produces less per person employed than does manufacturing industry, and partly from the fact that output per worker in agriculture itself is less in the South than in most other sections.

The South Atlantic Division

The group of eight states stretching along the Atlantic from Delaware to Florida is the most populous of the Southern divisions, and ranks third among the sections of the country, surpassing the West North Central, which has a far larger area. It is the most industrialized part of the South, the value created by its factories being much larger than that for both the other Southern divisions combined. Manufactures contribute more than agriculture to the income of the people.

The agriculture of the division is affected by the fact that a good deal of its land is either mountainous or swampy or sandy and that some of the tillable land is of rather poor soil, though there are areas of high fertility, particularly in the Piedmont region and between the Blue Ridge and the Alleghenies. The climatic range within its stretch of more

than a thousand miles is such that it produces crops as varied as wheat, tobacco, cotton, and tropical fruits. This section is the world's largest source of tobacco.

Manufactures are still much less diversified than in the northeastern divisions of the country, although more varied than elsewhere in the South. They include not merely the simple transformation of local raw materials but also the very extensive manufacture of cotton goods (the material for which is by no means chiefly of local origin), together with a number of other industries of a fairly elaborate type. There is abundance of coal in the northern states of the division: West Virginia runs neck and neck with Pennsylvania in bituminous-coal output. Farther south the mountains furnish a great deal of water power. Conditions are thus favorable for factory industry, and it is making rapid progress.

The East South Central Division

The four Southern states lying between the Allegheny range and the Mississippi River resemble the West North Central division in that the farms are much more important contributors to income than are factories and in the relatively slow growth of the population during recent decades. The Southern division differs, however, in having much denser farm population, not equaled by any other division. Because farms are relatively small, and for other reasons, the per capita income of the farm population is somewhat lower than in any other section of the country. The two most northern states of this division, Kentucky and Tennessee, have, in a large part of their area, an agriculture differing not very greatly from that of the states lying just north of the Ohio — mixed farming, with considerable development of stock-raising. In the states farther south cotton is the one great source of cash income for the agricultural population of the division.

The division has rich deposits of coal and iron, and is gradually building up a considerable iron and steel industry.

The forests of hard woods toward the north and of soft woods toward the Gulf of Mexico furnish the basis for another important branch of manufacture. Apart from these the factory industries are mainly for the supply of purely local needs.

The West South Central Division

Cotton and petroleum are the foundations of the economic structure of the West South Central division: in both it outranks any other region in the world.

The division resembles its still bigger neighbor, the West North Central, in presenting a wide difference of rainfall, and consequently of agricultural capacity, between its more easterly stretches and those to the west; it differs in showing rapid expansion of population during recent decades. This growth is partly due to the opening up of farm lands which had previously lagged behind agricultural settlement farther north. Perhaps in equal measure it is a result of the development of industry and commerce. The immense increase of the oil business has carried with it refining and other activities apart from the mere extraction of the crude product from the earth. This section is the only one except the Mountain division in which the value of the mineral products — all but confined to oil — exceeds that of factory output; in absolute value of minerals it is surpassed only by the Middle Atlantic states. The forests of this division, like those of the East South Central, are an important contributor to its wealth.

Agriculturally the division may be said to stand intermediate between its eastern neighbor and its northern neighbor. With wide range of climate, both as to temperature and as to rainfall, it produces crops as different as sugar cane and wheat, rice and grain sorghums. But in no other division does a single crop so overwhelmingly dominate as cotton does here. Cotton output, moreover, is steadily expanding, whereas east of the Mississippi it is standing still

or declining. Animal husbandry is a relatively unimportant feature in the eastern part of the division, but in the drier lands there still range millions of cattle, though the number tends downward.

The Mountain Division

Mining, stock-raising, dry farming and scattered irrigation farming characterize the vast, sparsely settled Mountain division. With nearly one third of the area of the country it has only $3\frac{1}{2}$ per cent of the total population. Its percentage rate of increase in inhabitants is rapid, but there is little reason to suppose that it will ever attain a dense population.

Though rugged mountains tear it asunder the division possesses vast stretches of land which but for lack of rainfall would blossom with crops. As it is, in view of the absence of world demand for agricultural expansion, the distance from markets and the handicaps of nature have kept down crop production. Irrigation brings large yields; but the area capable of irrigation is restricted, and in many cases the necessary investment is not justified under present conditions of demand. Most parts of the division have sufficient moisture to afford pasture, but this has usually very low carrying capacity. The value of animal products is much less than is turned out by the Middle Atlantic division, with one eighth the area.

In proportion to its size the Mountain division could scarcely be considered exceptionally rich in underground treasures, but over its vast area are scattered deposits more varied than are found in any other of the divisions, including almost every important mineral. This section ranks fourth or fifth among the nine in absolute value of mineral output, and in no other division do mines contribute so great a share of the total value created by economic activity. Factory industries are for the most part confined to the smelting and refining of nonferrous metals, oil-refining, and the supply of local needs for such articles as cannot be conveniently brought from the industrial sections of the country.

The Pacific Division

The western slope of the United States stands out by its exceptional climate, its swift growth of population, the relatively high income of the large majority of its people, and its world dominance in the moving-picture business. Had it a vast fertile hinterland such as the Atlantic states possess, the Pacific division, with its many natural advantages, might before very long rival the Northeastern states in population and in industry. What in fact will develop here depends largely on the unforeseeable future of methods of transportation serving to link this belt with the rest of the continent and with other continents.

Though they stretch nearly as far from north to south, the Pacific states present no such variety of temperature as those along the eastern seaboard; everywhere the climate is mild, though only well to the south do grapes and semi-tropical fruits flourish. The small range of temperature between the winter and summer contrasts strikingly with the climate of other sections. Moisture in some parts is deficient, but irrigation does much to bring relief. The coast has a very wide range of agricultural products, corn and tobacco being almost the only crops found anywhere else in the entire country which fail to flourish here. The dominance of fruits, however, marks a sharp contrast with all other divisions.

The forests of the northern Pacific coast are unparalleled anywhere; with the exhaustion of supplies in many other parts they have become the country's greatest source of lumber. Coal is lacking for the most part, but an immense hydroelectric development and petroleum production second only to that of the mid-continent field supply the needs for power. Manufacturing industry has therefore made rapid strides, and the value of factory output much exceeds that from agriculture. The foreign commerce of the Pacific coast is also large and growing. There are no satisfactory statistics by which to measure the economic significance of the motion

picture to California, but obviously it is very great — another gift of the climate, with its almost unbroken sunshine.

These factors favoring large production of wealth only in part explain the rapid growth of the Pacific division and the high average income of its inhabitants. The climate and the scenic attractions bring thither great numbers not only of tourists and of winter visitors but also of permanent residents who have “made their pile” elsewhere. New York City, Washington (D.C.), and Florida are perhaps the only other places in America to which people in large numbers thus flock to enjoy their years of retirement from active life.

CHAPTER VIII

AGRICULTURE AND THE FOODSTUFFS INDUSTRIES

As we have seen, the abundance of land and the growing efficiency of the farmer in the United States have made it possible to supply the needs of the population for farm products by the employment of a steadily diminishing proportion of the people, increasing numbers being set free to engage in other pursuits. Nevertheless agriculture still employs more workers than any other branch of industry; it is still the most necessary branch of all. Moreover, the United States ranks as the greatest agricultural country both in total value of output and in volume of exports. It produces about three fifths of the corn and the cotton and one fifth of the wheat of the world; it has about one tenth of all the cattle and one fourth of the swine.

SECTION 1. THE UTILIZATION OF LAND

So fundamental are the bearings of the abundance of land in the United States upon its entire economic life that the subject has already been discussed at some length in the chapter on resources. Abundance of land has much to do with the high standards of living of the people and with the large development of the elaborative industries. Throughout the chapter we shall observe its dominant influence upon the character of American agriculture itself. It is the keystone of the whole structure. It accounts for the manner in which the land is utilized, for the size of farms and the organization of farm management, for the methods of cultivation, and for the character of the products.

First let us consider in summary fashion the uses to which land is devoted. It will be found that much is allowed to

lie all but idle, and that an immense proportion is used for producing commodities by no means essential to human existence.

Of the total area of the country, according to the best judgment of experts, about 7 per cent is either required for residences, railroads, factories, and similar uses or is wholly incapable of production. Approximately one sixth is too

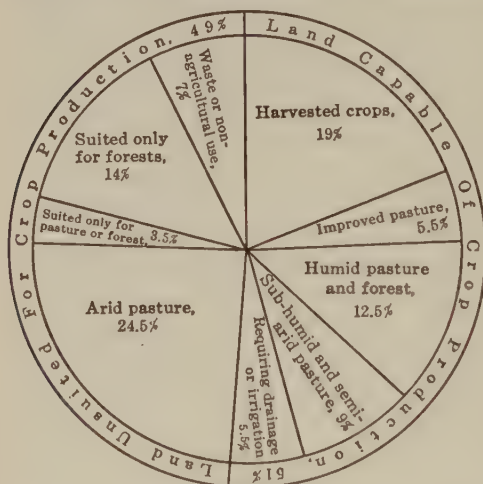


FIG. 43. Diagram showing the utilization of land in the United States

The percentages represent the proportion of the total land area. The distribution is approximate only. (After the United States Department of Agriculture)

In the first place, crops are in fact raised on less than one fifth of the land surface, about three eighths of the land capable of cultivation. To be sure most of the cream of the land is used. It must not be supposed that all the potential crop area could easily be brought into large production. Some would require heavy expenditure of capital and labor — for irrigation, or drainage, or removal of stones

rough to plow but is suitable for forestry, with some grazing. About one quarter, situated in the Far West, is semi-arid or arid, but is capable of pasturing a very considerable number of domestic animals. There remains somewhat more than half, say 975,000,000 acres, fitted to raise crops with greater or less efficiency.¹

So much for the potentialities. How are these in fact used?

¹The data regarding the United States in this section and in Figs. 43 and 47 are mainly from the article "Land Utilization" by Gray, Baker and others, in *Agriculture Yearbook*, 1923,

or stumps, or grading. Some at best has scarcely adequate moisture or is of inferior soil. The comparatively slow expansion of the area in crops since 1900 is in part due to these difficulties. Not to them chiefly, however. If the density of population approached that of western Europe or of eastern Asia the pressure would soon bring a great deal of additional soil under the plow. The halt in the expansion of crop area has resulted mainly from the fact that the country had enough already. Advancing yields per acre have added sufficiently to output to care for the growth of population, and the increasing competition of such countries as Canada, Australia, and Argentina has checked the incentive to cultivate more land for the purpose of exports.

But there remains the question, How much croppable land is really needed for purposes other than crop production — for growing live stock and for growing trees? Land capable of cultivation is, of course, suitable also for forest and for pasture. Even in countries where pressure of population on land resources is heavy, some good land is left untilled because of other needs. As a matter of fact, the United States uses croppable land for other purposes with a liberality rarely equaled elsewhere, a liberality justified only by the great abundance of its resources. The area suited for growing trees but not for raising crops is so large that many peoples would consider it quite sufficient for a reasonable supply of wood. Yet in addition the country has left under trees nearly one fifth of the potential crop land. The American people consume wood very freely; until a short time ago wastefully. More than two hundred cubic feet of standing timber is consumed each year for each person in the population. For Germany and France the corresponding figure is barely one eighth as great.

As regards the use of crop land for pasture the situation is similar. The immense part played by animal products in American agriculture and in the diet of the people is more fully set forth in a subsequent section. Of the land used to produce supplies for the domestic market, animal food

products claim directly or indirectly several times as much (reckoning in terms not merely of area but of quality) as do vegetable foods for human consumption and other products for the direct use of human beings. Several hundred million acres are employed as arid pasture and as humid pasture on croppable land, and, moreover, much the greater part of the cropped land itself serves to raise hay and grain and forage for the feeding of stock.

These facts are conveniently summarized in Fig. 43, supplemented by Fig. 47 (page 365), showing the uses of the crop land itself. It should be borne in mind that the quality of the land represented by the several segments is by no means alike. Broadly speaking, the land actually in crops is the best, and that in humid pasture the next best, though itself embracing a wide range of quality. The arid pastures of the West have on the average a carrying capacity equal to only one fifth that of the rank and file of humid grazing lands. The statistics present a striking picture of the abundance of agricultural resources.

SECTION 2. FARMS AND FARM WORKERS

The greatest factor in making or marring the lot of the tiller of the soil is the amount of land (quality considered) whose forces are working under his hand. Next in importance ranks the system of land tenure, the manner in which agriculture is organized. In both these respects the American farm worker is peculiarly fortunate.

Crop Area per Farm Worker

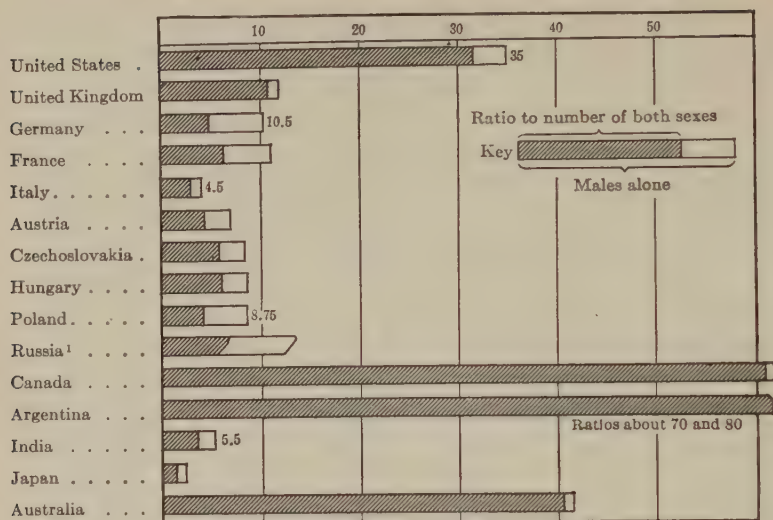
From the facts already presented as to the abundance of land it follows almost without saying that the average farm worker is making use of a relatively big area of soil. More specific statistics emphasize this point. It is preferable to confine attention to land under crops, by reason of the great diversity in the quality of other lands. It must not be for-

gotten, however, that in the aggregate these other lands produce a great quantity of valuable animal products which go to enhance the earnings of the workers.

We have seen in Chapter IV, Section 1, that in America a much bigger slice of crop land is at work for each member of the population as a whole than in most countries. But farm workers constitute a smaller proportion of the people than is ordinarily the case elsewhere. Evidently, therefore, the United States ranks very high as regards the average amount of crop land per worker on the soil. Close statistical comparisons as to this average are impossible. Disparities in the quality of land affect them somewhat. Difficulty is also caused by the variations in the census definition of "farm workers," partly arising from actual differences in the extent to which the women and children help in the operations. To make the averages per farm worker more nearly comparable, it is perhaps preferable to exclude women working on the land, since many of them have other duties and devote a smaller part of their time to farm work than do men. It must be borne in mind, however, that in many European countries poverty compels women to do far more farm work than they do in America. In Poland and Germany, for example, as many women as men are reported to be engaged in agriculture, whereas in the United States men so reported outnumber the women more than eight to one. Even when comparison is confined to averages per male worker they show with sufficient clearness the fortunate position of American agriculture (see Fig. 44, A).

In the United States there are between three hundred and three hundred and fifty million acres of land in crops. The number of male farm workers is between nine and ten million. Thus for each male person employed on farms there are some thirty-five acres of land in crops. In none of the thickly populated countries of the Old World has the average tiller of the soil anything like so much. In Germany there are less than eleven acres of crop land per male agricultural worker, in Poland about nine (the figures are cut

A. NUMBER OF ACRES OF CROP LAND PER FARM WORKER



B. CROP PRODUCTION PER FARM WORKER

EQUIVALENT TO BUSHELS OF GRAIN (60 POUNDS)

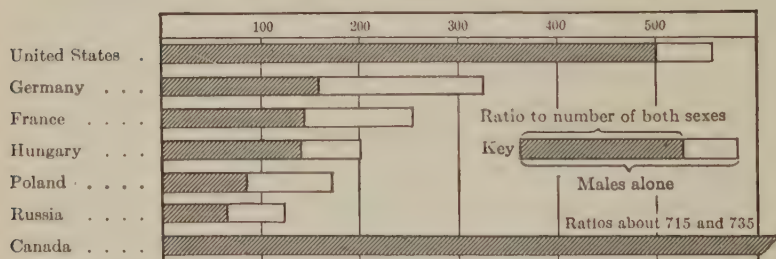


FIG. 44. Diagram showing area of crop land and crop production per farm worker in typical countries

Averages are shown both on the basis of the total number of farm workers of both sexes and on the basis of males alone, the latter being represented by the full length of the bar in each case. Section A shows, for example, that in the United States there are about thirty-five acres of crop land for each male farm worker and about thirty-two acres for each worker of either sex. Section B represents, in terms of bushels of grain of sixty pounds (the weight of a bushel of wheat), the combined production, per worker, of the several cereals, potatoes, beets (for fodder or sugar), cotton, and wine. This diagram is discussed in Section 3 of text (see especially the footnote on page 359)

¹ The Russian official figures are not closely comparable with those for most other countries and have been adjusted by estimate of the writer.

in half for these two countries when females are included), and in Italy four and one half acres. In Japan the amount is scarcely one tenth as great as in the United States. Russia, not counting land left fallow to recuperate its strength, has only about thirteen acres in crops per male farm worker, and a great deal of the land is poor. Vast numbers in Europe and Asia have to wring their whole livelihood from pitiful bits of land hardly as big as the home site, orchard, and garden of the American farmer.

Prevalence of the Owner-Worker; Size of Farms

Not only does the average tiller of the soil in the United States work a relatively big amount of land, but a very large proportion of the workers possess the land they cultivate; they are owner-workers. In contrast with a good many other countries, owner-workers outnumber either tenant farmers or hired farm workers. Of male farm workers¹ the relative numbers are approximately as follows (1920 data):

Owners working on their own farms	3,700,000
Tenant operators of farms	2,400,000
Hired farm workers, including male members of the operator's family	3,300,000-3,600,000

Only two farms out of five report the paying out of any money for labor, and these spend on an average only about \$340 each for that purpose annually (1924 data).

The absence of any large class of landless agricultural laborers in America is an important social phenomenon. It is in striking contrast with the situation in England, in Argentina, and in a number of other countries of the world, although it is true that in certain foreign countries, even where land is scarce, the system of tenure puts most of it into the ownership of those who actually work the soil. A

¹ Census statistics can scarcely distinguish between women who do much work in actual farm operation and those who do little of it; most of those reported as farm workers are employed on the farm of the family to which they belong.

great many of the "hired" workers on American farms, moreover, are members of the family of the farm operator. Of the male farm workers reported in 1920, other than owners and tenants, two fifths were of this class; in the case of female workers the ratio was nearly three fourths.

From the fact that the number of American farms (counting both the owner-operated and the tenant farms) is so large it follows that the average farm is of only moderate size. The prevalence of medium-sized farms is significant both from the standpoint of the position of the farm workers and from that of the methods of agriculture. The situation in American agriculture is utterly different from that in mining, manufactures, and transportation. There is on the land almost nothing that corresponds to the vast plant or to the still vaster multi-plant corporation, by which so large a part of the other industries is conducted. Against less than two hundred thousand factories there are more than six million farms, with only a slightly greater number of workers than are engaged in manufacture.

The average farm in the United States contains 145 acres. This is not a meaningless quotient, resulting from the lumping together of a small number of huge tracts and a multitude of insignificant tracts. In the most typical farming regions the large majority of farms are of intermediate size. Thus in Iowa, where the general average (156 acres) is a little larger than in the country as a whole, only one eighth of the farms have less than 50 acres; on the other hand, less than one in a hundred has over 500 acres, and together such farms comprise not over 5 per cent of the farm land of the state. In Alabama, a typical Southern state, the average farm contains 76 acres, a lower figure than in Iowa partly because cotton requires such intensive labor and partly because of the somewhat more primitive methods of farming. But here too the range in size is moderate; only 15 per cent of the farms contain less than 20 acres and less than 1 per cent exceed 500 acres. Data for such typical states are more significant than those for the entire country, where the wide

differences in climatic conditions and in the uses to which land is put naturally bring about a considerably greater range in the size of farms. In the semiarid Western grazing region, where it takes ten or twenty acres or more to support a steer, the ordinary ranch is, of course, much larger than the ordinary farm in the Corn Belt; besides, in that region a few ranches of vast size still persist from the earlier days. On the other hand, near large cities, and in certain restricted areas peculiarly fitted for growing fruits and fresh vegetables, there is a call for small truck farms and orchards under highly intensive culture.

Tenancy

The significance of the prevailing moderate size of farms in the United States would be greatly modified were the typical farm a tenant farm. Especially objectionable from the social standpoint is a tenancy system that involves the ownership of great tracts by a few individuals or that involves strict dictation by the landlord over the tenant's operations. The situation of the tenant under such circumstances may be little different from that of a hired farm laborer. Fortunately, however, such is by no means the prevailing condition in the United States. Tenancy in most cases does not imply "landlordism" in the opprobrious sense. There are few great estates parceled out among numerous renters. Except in the South relatively few landlords own more than one or at most two or three tenant farms; even in the South the ownership of land leased to tenants is pretty much divided. In most sections the typical landlord is a retired farmer, and the typical tenant is a young man on his way to becoming owner; often he is the son or son-in-law of the landlord. There are, of course, many exceptions.

In the United States in 1925 somewhat less than two fifths — $38\frac{1}{2}$ per cent — of the farms were operated by tenants. The proportion is lowest in the older Eastern states and the Far West and highest in the South, where a large

proportion of the tenant farmers are Negroes (nearly half in the States east of the Mississippi). In the Middle West, the richest farming region, tenancy is substantially as common as in the country as a whole. Apart from the South, it may be stated that the richer the soil and the higher the price of land, the greater is the proportion of farmers who rent. Tenancy increased rather rapidly from 1880, when the proportion of tenant farms was barely one fourth, to 1900, when it was well over one third ($35\frac{1}{2}$ per cent). Since then the change has been much slower. The increase in tenancy since about 1900 has been the most marked in the Middle West, especially in the states beyond the Mississippi. It was in these states that (until the postwar deflation) the price of land advanced most rapidly. The rise made it possible for many farmers to retire on reaching middle age, but it made it harder for young men or incomers to buy land.

Reasons for Small-Scale Operation

The contrast between agriculture and other branches of industry as to scale of operations calls for explanation. This will be found in the essential nature of the farming business. Save in somewhat exceptional conditions in regard either to the character of the population or to the type of agriculture, experience in most countries has thus far seemed to show that the farm which employs little labor outside the family is usually more efficient than the big estate. Recently the question has been seriously raised whether in America the time may not be ripe for the introduction on the land of the big-scale and highly organized methods characteristic of factory industry. The arguments heretofore opposed to huge farm units may be stated as follows:

The circumstances which make large-scale operation advantageous in other industries are lacking here for the most part. There is little occasion, especially during any one period of the year, to perform the complex variety of tasks that can be better done by division of labor. At one time

there is little to do but plowing, at another time most of the work is cutting hay, at another the harvesting of some one crop. Similarly, it has been urged that not much is to be gained by high specialization of machinery or by the use of machines of immense size. Against farming on a big scale are mentioned such drawbacks as these: that the hired laborer is likely to lack interest, that his work cannot be standardized or supervised to any such degree as in the factory, and that piece payment is not practicable for most farm tasks. The man working his own farm has the incentive to produce as much as possible and at the same time to keep soil and equipment in good condition. He may not be so expert as the owner of the big farm nor have such adequate capital, but he is not dependent on others to carry out his plans and purposes. Whether these contentions will continue to hold good in a country so advanced in technique as the United States remains to be seen.

But quite apart from economic considerations, workers on the soil have always, at least in the past, felt a profound desire to own land. Land-ownership breeds pride and the sense of independence and security. A "stake in the country" makes for good citizenship. In the early days the American pioneer carved his own little farm out of the wilderness. Later on it was the wise policy of the government to parcel out its vast public lands among small owners. It would require a wage much higher than his return from independent operation to win the typical American farmer to become the hireling of the big land baron. The future may witness the development of larger-scale operations in farming in the United States, but hardly unless the dignity of the worker is fully preserved.

Land Tenure in Foreign Countries

It is impossible within any reasonable compass to compare the United States with foreign countries as regards the size of farms, the conditions of land tenure, or the general

organization of agricultural operations. Conditions vary widely as between different countries and often within a single country itself. From the fact that the farm worker in America has so much land on which to work, it follows that his condition is likely to be better than that of the worker in more crowded countries, whether that worker be the small owner, the tenant, or the hired employee.

Most of the countries of Continental Europe present a mixed system. Side by side there exist great estates, either rented out in small parcels or perhaps more often operated as units, and a multitude of small "peasant farms" owned by those who till them. One will find in many of these countries few farms of intermediate size, such as are typical in the United States; so far as such farms do exist they usually employ much more hired labor than an American farm of similar magnitude, and this for the obvious reason that labor is relatively abundant and land scarce. It is because of these conditions as to tenure that "land hunger" is the major economic problem of so many countries, a problem that often becomes the controlling political force and even breeds revolution.

A few illustrations of the land situation in Europe may be presented. Take Germany. To make a fair comparison with American farms we must exclude some hundreds of thousands of insignificant tracts which are scarcely expected to be the major source of livelihood to their holders. Even so, in prewar Germany 55 per cent of the farms were of less than ten acres as compared with 6 per cent in the United States. Conditions in Poland are even more striking. Compare Lwów (Lemberg), the most crowded agricultural province, with the state of Iowa. The former has a farm population (not total population) of over two hundred per square mile, and the latter (calculating on a comparable basis) a farm population of less than twenty-five. Disregarding holdings of less than $2\frac{1}{2}$ acres (1 hectare), 61 per cent of the farms of Lwów contain less than $7\frac{1}{2}$ acres, and these together make up 19 per cent of the total farm area of the district and account for 29 per cent of its crop land. Farms of less

than 25 acres constitute nearly 97 per cent of the total number. What a contrast with Iowa, where 76 per cent of all the farms are between 50 and 260 acres in size. But look at the other end of the scale. Less than half of one per cent of the farms in Lwów have more than 500 acres each, but these together own about 43 per cent of all the land in farms and 22 per cent of the total crop area (a smaller ratio because the estates go in heavily for forests). In Iowa less than 5 per cent of the land is in holdings of this size. The middle-sized farm dominates in America. It is a negligible factor in most parts of Poland; in Lwów only 4 per cent of the land is in farms of between 50 and 250 acres, the prevailing size in Iowa.

Because Russia looms big on the map many people fancy it is thinly peopled; but much of the land even in European Russia is waste, and most of what is usable is crowded with toilers. Although the former holdings of the nobility have been broken up and added to the peasant farms, the average farm operator has only 9 acres of crop land as against 50 or 60 acres in the United States (the definition of crop land is not precisely the same in the two countries). More than 40 per cent of the Russian farms contain less than two dessiatines, or $5\frac{1}{2}$ acres, of crop land. In Russia, as in a large part of Europe and Asia, you would have to squeeze the American farm to a quarter its size or less to match the area with which many millions of tillers of the soil must put up. The American farm is a small-scale enterprise compared with the American factory; it is big compared with the one-man farm of the Old World.

SECTION 3. FARMING METHODS AND THEIR RESULTS

The Sparing Use of Labor

It is difficult to generalize regarding the methods of farming in the United States. Owing to the wide diversity of soil and climate over so great an area, to differences in the distance from centers of consumption, and to the variety of the products demanded by a population of high standards

of living, there are many kinds of farms. Methods appropriate in one locality would be quite out of place in another where quite other conditions prevail. Almost everywhere, however, the abundance of land shows its powerful influence. Except in the case of a few products which by their very nature require highly intensive culture, land is used lavishly and human labor sparingly. Why should it be otherwise? Indeed, how could it be otherwise? America possesses much land per farm worker. Why not use it freely? The result is large production not per unit of land but per unit of labor, and it is this that spells well-being for the people. Why work two men on a hundred acres to make it produce three thousand bushels when on twice as much land lying to hand they can raise four or five thousand bushels?

In China a great part of the soil is turned with the toil-some spade. Land is too scarce to devote much of it to feeding work animals. The coolie may dig up in a day as much as the American farmer with his four-horse or six-horse team or his tractor plows in a fraction of an hour. In Japan millions of men and women and children set out with infinite patience, stalk by stalk, rice that has been started in frames. Between dawn and dark one person may cover less area than the power drill in America seeds to wheat in thirty minutes. A large part of the grain in the Old World is reaped by hand with the cradle or the sickle; not because the farmers are blind to the convenience and efficiency of the self-binder, but because land is scarce and toilers are many. Well as its soil and climate are adapted to sugar beets and other root crops, the United States plants them but little; they require too much hand labor.

Use of Capital

The American farmer is by no means so niggardly of capital as of labor. Precisely because he has so much land he has been able to accumulate no little wealth with which to improve and equip his holdings. The United States uses

more capital per man engaged in agriculture than almost any other country; possible exceptions are Canada, Australia, and New Zealand. In proportion to the area of land in farms, to be sure, capital is less abundantly employed in the United States than in northwestern Europe. Land there is plowed deeper, is harrowed and rolled more thoroughly, is leveled and underdrained at heavy expense, and is fed with costly fertilizers.¹ The result, of course, is large yield per acre. But it does not pay the United States to use so much capital per acre as these countries: it possesses too many acres. The factors in agricultural production must be combined in proportion to their relative abundance. Land scarcity is the chief spring of intensive cultivation in western Europe. Compared with the poorer nations of southern and eastern Europe and of Asia, the United States not only uses far more capital per farm worker but actually more per acre of land. Its soil is in fact cultivated almost if not quite as intensively as that of many countries where land is very much scarcer. Because it is rich it can afford to aid human labor on the land with much more capital than is used even where capital is most needed to increase agricultural output.

There are no adequate statistics of the value of capital employed on the farms of most foreign countries. The number of draft animals would furnish a significant indicator; but even here precise comparisons are scarcely possible, both because of differences in the size and strength of the animals and because one cannot accurately determine how many of the cattle (which are used far more for farm work in many other countries than in America) are employed as draft animals. The Department of Agriculture has estimated that in the United States there are about eighty draft animals per thousand acres of crop land, that the figure for England is considerably higher, about one hundred and thirty, but that in Italy, France, and Germany the ratio is lower, ranging from about forty-five animals

¹ The large use of fertilizers is partly due to the fact that the abundant moisture favors their working; they are of less benefit in drier climates.

per thousand acres to seventy. In most eastern-European countries the averages are lower still. We have seen that in America the average farm worker has very much more crop land at his disposal than the European worker has. It follows that he is aided far more liberally by the work of animals. Moreover, there are more tractors on the farms than on those of Europe. In 1925 the American farmers owned about five hundred thousand tractors, and the number increases markedly each year. The smaller tractors can do about as much work as five horses, but a good many of the machines are equal to ten horses or even more. The actual number of horses and mules is about twenty-two million, or more than double the number of persons engaged in agriculture.

The great number of draft animals and tractors on American farms implies the use of much machinery, and especially of machines of large size which enable a few men (very often a single man) to apply effectively the power of several horses. Gang plows, harrows of great width, powerful harvesters which cut a wide swath and deliver the grain tied in bundles, are familiar illustrations. Recently there have come into use in the Western wheat fields many huge "combines" drawn by twenty or more horses or by powerful tractors. These not only cut with great rapidity but thrash the grain ready for instant shipment. In countries where labor is cheap, capital scarce, and land scarcer you may see one man driving a single horse or ox which pulls the plow or harrow while another man guides it; even on big and well-managed estates large machinery is often considered as a reserve for emergencies, and the bulk of the work is done by simpler machines or tools requiring much more human labor.

The total value of the implements on American farms in 1925 was reported as \$2,700,000,000. This is more than \$400 per farm, or \$250 per person engaged in agriculture. In addition, the value of horses and mules was more than half as great as that of farm implements. Comparable statistics for the Old World are not available; but it is certain that in most countries the value of such equipment per

farm worker is very much smaller, although the advanced nations of western Europe, as well as Canada, compare favorably with the United States in this respect.

*Yields per Acre and per Man; the Farmer's
Standard of Living*

The facts thus presented as to the use of labor and of capital on farms serve to illuminate the position occupied by the United States among the countries of the world as regards crop yields per acre and crop yields per man. It is not uncommon to hear American farmers decried because they do not get thirty or forty bushels of wheat per acre as farmers in some countries do. This criticism neglects the fundamental difference in conditions: the abundance of land in America and its scarcity in the Old World. Far more significant as a measure of the position of agriculture is the output per farm worker.

Even American yields per acre are not to be scoffed at (Fig. 45 presents comparisons for major crops). It is true that several countries of northwestern Europe wring from the land two or three times more per acre than the United States taken as a whole, and even much more than in the best American farming sections; but these countries are exceptions, not paralleled elsewhere. In other advanced agricultural nations of Europe, such as France, Italy, Austria, Hungary, Czechoslovakia, and Poland, the yields exceed those in the United States by only from one fifth to one half. Rumania and Yugoslavia fall below America. The long-suffering Russian peasant gets much less per acre than the farmer of the United States; the same is apparently true of India, though direct comparison is not possible except for two or three crops. It is not surprising, of course, that yields are higher in the United States than in Argentina and Australia, where land is so abundant and where rain is often deficient. The larger yields in Canada are due to the fact that so great a part of the soil is practically virgin.

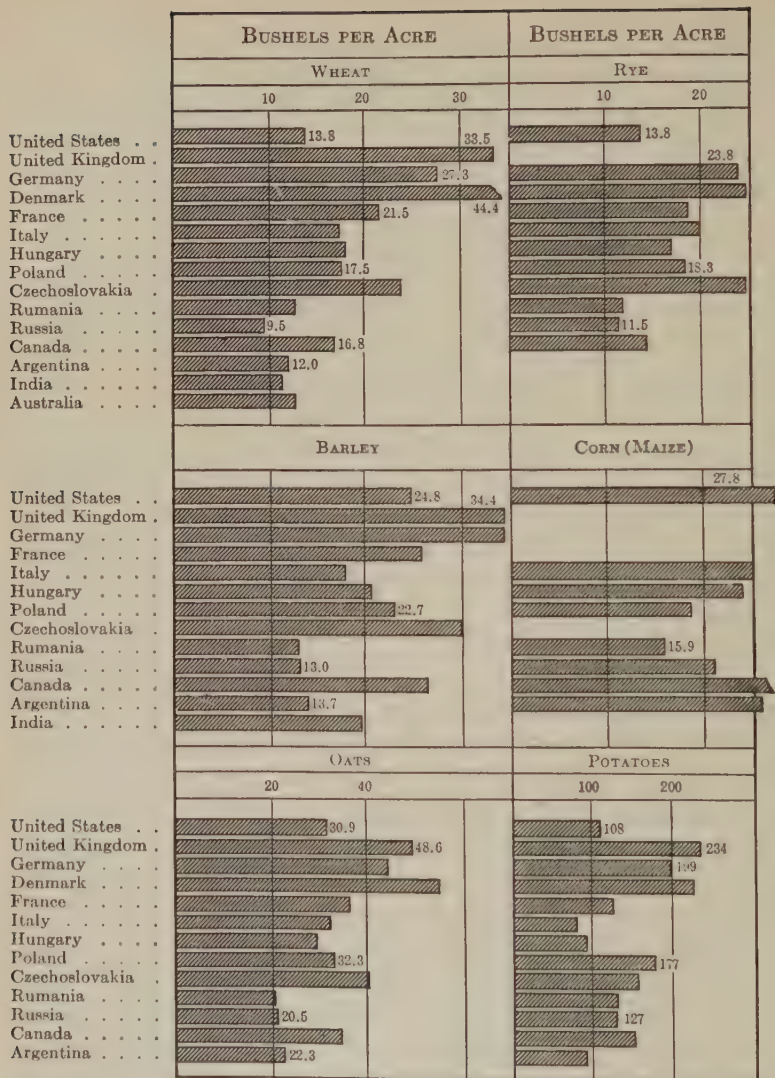


FIG. 45. Diagram showing the comparative average yields per acre in typical agricultural countries

The figures are all in terms of bushels (of the American standard) per acre. The weights per bushel are for wheat and potatoes 60 pounds, for corn and rye 56 pounds, for barley 48 pounds, and for oats 32 pounds. In countries for which no bar appears the given crop is either not raised at all or is too unimportant to afford typical averages. The figures represent the annual mean for the five years 1921-1925

Crop yields per man are higher in the United States than in almost any other country ; the only conspicuous exception is Canada. Experts of the Department of Agriculture have calculated that just before the World War crops in England, Germany, Belgium, and France, taken together, were about 40 per cent more per acre than those in the United States, but they found the average output of the American farm worker about 160 per cent larger than even in these advanced European countries. A similar comparison for recent years, worked out by the writer, is shown in Fig. 44 (see page 346). The data are necessarily rough, but they serve to show the general order of the differences in output per farm worker.¹ Averages are presented on the basis both of the total number of workers and of the number of male workers alone ; the latter are in some respects the more significant, although the great numbers of women who toil in the fields of most European countries are no small factor in the production.

In the United States the combined annual output of cereals, potatoes, beets, and cotton is equal, in terms of cereal units, to more than thirty-three thousand pounds, or about five hundred and sixty bushels of sixty pounds, per male worker on the farms. In Germany, highly advanced though it is in agriculture, the corresponding figure is only about three hundred and twenty-five bushels. If the calculation is based on the workers of both sexes, the difference is more than three to one in favor of the American farms. France, Hungary, and Poland show still smaller averages (in France the production of wine, which is a large item, is taken into consideration). In Russia the average per male

¹ The several cereals are taken as equivalent, weight for weight (not, of course, bushel for bushel) with one another, although there are differences among them in food value and unit price. The root crops are taken as equivalent to one third their weight in cereals, one pound of cotton as equal to ten pounds of cereals, and one pound of wine as equal to the same weight in cereals. These ratios correspond roughly to the differences in price. It is probable that if still other crops could be counted in, the relative position of the United States would stand about the same in comparison with Germany and France and still higher in comparison with Poland and Russia.

worker is less than one fourth the average in the United States; and when both sexes are reckoned in, the disparity is about one to eight.

Even this comparison of crop production per man fails to show the full advantage of American agriculture over that of such countries as Hungary, Poland, and Russia, for the reason that in the United States animal products, which are not taken into consideration in the diagram, are relatively much more important as compared with crops than in these countries. The truth is that in vast areas of Europe and Asia agriculture is pitifully inefficient. The peasant there is caught in a vicious circle. Overcrowding of the land breeds poverty; poverty spells want both of capital for farming and of education for the farmer; from this lack springs poverty again; and because of poverty and ignorance, an excessive birth rate makes the pressure on the land resources ever more severe.

These wide differences in per capita output spell even greater differences in the well-being of the farming population. When income is doubled the opportunity for comfort in life increases several fold. The great bulk of what the Russian peasant raises must go to feed himself and his family and the live stock necessary for tilling the soil. He takes most of his grain to the neighborhood mill and brings back the flour and meal. He has little to sell. There is reason to believe (precise statistics are impossible) that what remains after he has provided food for his family and his work animals is not one tenth as much as remains to the typical American farmer, even in these recent years of agricultural depression. It is this margin above the ultimate minimum of subsistence that measures the ability to command those things which in large part distinguish the life of man from that of the brute. No American who has not actually witnessed the manner of life of the peasantry of eastern Europe and of Asia can picture its poverty, its often downright misery.

The sharp decline in prices after the World War hit the farmers of the United States severely. Many of them find

their incomes (in terms of buying power) little greater, some even less, than in the prewar period, and this in the face of a general advance in the well-being of most classes of the population. Even so, the average American farmer is very much better off than his fellows in most other parts of the world. It is not suggested, of course, that the farmer's position in life in the United States should be judged by comparison with farmers in less fortunate countries. He rightly desires a status satisfactory as compared with that of other classes in his own country.

SECTION 4. FARM PRODUCTS

The policy of American farmers as to the products they shall raise, like their methods in other respects, is largely determined by the abundance of land.

In the agriculture of any country the choice of products is to no small extent limited by the physical conditions of soil and climate. The farmers of some countries are greatly influenced, moreover, by trade relations with the outside world; they may be producing largely for export, or they may, on the other hand, have to adapt themselves to the fact that their country must normally import a great fraction of its requirements of agricultural products. However, in any country which has a more or less normal soil and climate and which at the same time is in large measure self-sufficient, the amount of land available and the standard of living of the people become major factors in determining the farmer's program of production. The standard of living is itself, as we have seen, governed largely by the amount of land at the disposition of the people.

Because land is abundant and standards of living high, American agriculture produces an exportable surplus, and produces for domestic consumption an exceptionally large proportion of relatively expensive commodities, many of which, at least from the point of view of consumers in most countries of the world, rank as semi-luxuries or even luxuries.

Calculating values on the farm basis rather than as of port of shipment, the country sends abroad one eighth to one seventh, in value, of the products of its soil. The dominant items exported are cotton (which accounts for nearly half the total), wheat, pork products, and tobacco. These are all products for which American soil and climate afford peculiar advantages.

Turning to the products raised for domestic consumption we find, among other evidences of the advanced standards of demand, an exceptionally big output of animal products as compared with vegetable products, and among the latter an unusually large proportion of fruits and fresh vegetables as against a relatively small proportion of such cheaper products as rye and potatoes.

Animal Products versus Vegetable Products

In very few countries is so large a share of agricultural activity devoted to animal husbandry as in the United States. The exceptions consist of certain sparsely settled semicivilized countries, largely mountainous or desert; a few newly settled countries, such as Australia and Argentina; and Holland, Switzerland, Denmark, and Ireland, these last making a specialty of raising and exporting animal products while importing grain. Liberal consumption of meats and of dairy and poultry products is characteristic of the American diet. In prosperous prewar Germany the average annual consumption of these classes of food (not counting milk consumed as such) was about one hundred and sixty-five pounds per capita. In the United States it is about two hundred and twenty-five pounds. In none of the more densely peopled countries of the world — not even in England — is meat eaten so generously; in many the consumption is not one third as great. The difference in consumption is still more marked with respect to fresh milk and butter. "*Bread and butter*" is a commonplace phrase in relatively few countries.

The best measure of the importance of animal products as compared with vegetable products is their money value. The value is the resultant at once of the quantity of land used, of its quality, and of the amount of capital and, above all, the amount of labor that are devoted to the production of the two classes of commodities. It is obviously impossible to compare the value of the animal products of the farms directly with the gross total for crops, since a great part of the crops is fed to the animals. The relations may be best appreciated from Fig. 46. The value of the vegetable products here shown does not include pasturage, but does cover the output of farm forests as well as what are ordinarily called crops.

The gross value of vegetable products in the two years 1925 and 1926, which are fairly typical of the entire period from 1923 to 1928, averaged about \$9,700,000,000 annually. Of this total nearly two fifths, or \$3,700,000,000, represented products fed on the farm either to work animals or to food-producing animals; it is probable that the work animals account for about one third of the crops fed. The net value of crops remaining was about \$6,000,000,000 per year. Against this sum animal

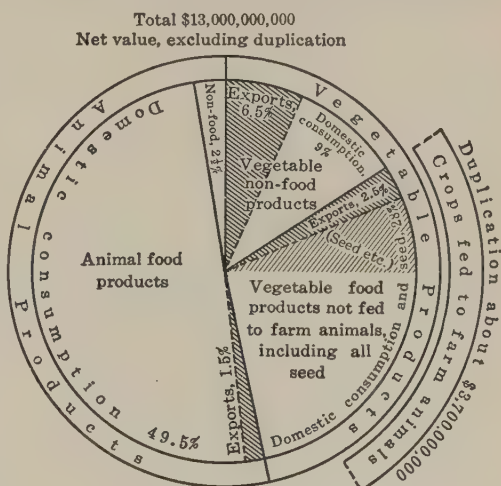


FIG. 46. Diagram showing the relative importance of the major classes of farm products in the United States according to value

That part of the diagram lying within the circle represents the value of farm products after deducting the value of crops fed to farm animals, indicated by the sector shown outside the circle. A part (not deducted in the diagram) of the vegetable food crops is used as seed and a small fraction is destroyed or wasted in one way or another. For further description of the diagram see text

products were valued at \$7,000,000,000, a value made up from the contribution of the pastures and of the crops fed, plus the addition made through the transformation of vegetable products wrought by the animals and through the work of the farmer in caring for them.

It is clear, therefore, that animal products are a more important goal of the activity of the farmers than are vegetable products. Still more conspicuous appears the influence of the American demand for meats and for dairy and poultry products when the commodities raised for export are excluded. In export trade vegetable products, led by cotton, far exceed animal products. Of the value of that part of farm output which is intended for domestic use, nearly three fifths represents animal products (roughly \$6,750,000,000 out of \$11,600,000,000). Even this ratio fails fully to indicate the relative position of animal products in the food supply, inasmuch as nearly all of these actually serve as food, whereas a great deal of the vegetable output does not, since it includes cotton and other inedible commodities and since a material proportion even of the edible products must be used for seed. For human food consumption in the United States the farmer supplies animal products to a value more than twice as great as that of vegetable products.

The foregoing analysis is from the standpoint of the relative importance of the final products and not from that of the factors contributing to the total value. From the latter point of view crops take on much greater weight, of course, since they are the source of a large part of the value of the animal products. Cultivated fields and the work and capital applied to them unquestionably contribute more to the total value of farm output than do pastures, feed lots, stock barns, and non-work animals, with the capital and labor applied to them, taken together.

The commanding position of animal husbandry in the United States is best measured by values, but it is also brought into sharp relief by the statistics of the area of land devoted to this purpose. This land includes (1) pasture

not suitable for crop production, (2) pasture on land capable of raising crops, and (3) land in crops used to feed animals (apart from work animals which aid in producing crops for direct human use).

Let us begin with crop land as being more nearly uniform in quality than pasture land (see Fig. 47). Take the area devoted to such crops as are actually intended for direct human consumption in the United States. Add thereto the land cropped to feed work animals engaged in producing this part of the crops. Compare with this total the area intended directly or indirectly to produce animal food for domestic use. The latter total is much more than twice as great; it represents about 58 per cent of the total crop area as compared with 25 per cent for the vegeta-

ble products. America's biggest crop is corn, and far more than half of it goes directly to nourish food-producing animals.

Pasture land varies greatly not only in its capacity but also in the degree to which that capacity is utilized. A good deal of land serves both as pasture and for the production of wood. In the more humid parts of the United States there are many millions of acres of improved pasture that compare favorably in quality with land actually in crops. In these same regions, however, is found a much greater area of unimproved pasture, including woodland pasture. Some

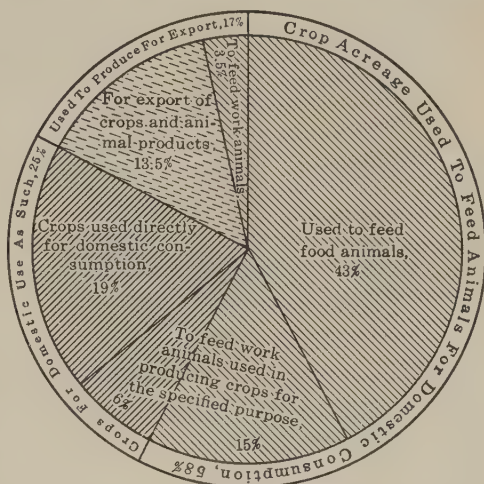


FIG. 47. Diagram showing the division of the area of harvested crops according to use of the product

After the United States Department of Agriculture.
For further explanation see text

of this is decidedly inferior, but a good deal is fairly comparable with the actual present crop land in quality and could, were there pressure on land resources, be either turned into crops or by improvement made much more productive as pasture than it now is. At a rough estimate, taking into account the quality of the land, the United States uses from two thirds to three fourths as much of its potential crop-producing resources for pasturing animals as for raising crops.

Finally, the United States devotes to pasture some hundreds of millions of acres of semiarid and arid lands most of which are unsuited for crop production. This area has on the average a carrying capacity per acre equal to perhaps one fifth that of typical unimproved pasture in the humid regions. Low as this may be, the extent of such land available is so vast that on it alone could be produced more meat than would supply the needs of a population with a standard of living such as prevails in a large part of the world.

It is true that the crop lands and the pasture lands feed work animals as well as food animals, but the requirements of the former are not more than a third those of the latter. The number of horses and mules is about 22,000,000 as compared with 60,000,000 cattle, which eat about the same per head, and the 50,000,000 swine and 35,000,000 sheep must together consume about as much as the work animals. It is safe to say that of the productive resources of its lands the United States employs from three to four times as much to raise animal foods for consumption by its own people as to raise crops for their use. There could be no clearer evidence of the abundance of land in America than this.

The position of animal husbandry in the agriculture of foreign countries varies widely. Differences in the quality of land greatly affect it. Land that lacks moisture can often supply some grazing, even though it may be incapable of tillage. In a country where there is much such land, as in Australia or Argentina, the number of animals is small in proportion to the area, but since the population is likely to be sparse the ratio of animals to human inhabitants may

be high. In a fertile country the ratio of animals to area is usually high ; but if population is crowded, the ratio to the number of inhabitants will be low, and under such conditions the people must either import animal foods or use them sparingly. The United States, occupying an intermediate position with respect to quality of soil, has fewer animals in proportion to area than some of the European countries ; but since it is not very densely peopled and has a population of exceptionally high buying power, the ratio of animals to inhabitants is much greater than in most countries of the world.

The Ranking of the Crops

The ranking of the several major crops of the United States with respect to value is materially different from that with respect to the area of land they occupy. It is only natural that the average value per acre should vary widely. For one thing the land used for one crop may on the average be more fertile than that used for another. Again, certain crops are raised at a greater distance from market centers than others. Much more important are the differences in the amount of capital and of human labor applied per acre. Some crops by their nature must be more intensively cultivated than others. Hay requires the minimum of effort : some is cut from land that has never been plowed and a great deal from land plowed and planted only at intervals of several years. It needs no tillage during growth. The harvesting is very simple. In contrast, garden vegetables and small fruits require a great amount of labor in planting, cultivating, and gathering for use. Corn must be tilled during the period of growth, a process not necessary for wheat and other small grains. Cotton requires similar care, and, besides, it is for the most part picked by hand, thus demanding a much greater amount of human labor than does the harvesting of the grains. Of course the crop which brings in more per acre is not necessarily the more profitable crop to raise. Broadly speaking, the farmers of each section

have learned to plant those crops which under the local conditions of soil, climate, distance from market, price of land, and cost of labor bring them in the largest net return.

From the standpoint of value corn leads all American crops, representing one fifth of the total. The extraordinary adaptation of the soil and climate of the Middle West to this cereal, and its high efficiency as an animal food, give it a position such as it occupies in almost no other country. Hay covers an area a trifle larger than corn, but with a smaller value per acre; it ranks a little below cotton in value. The latter accounts for about one sixth of the total value of crops, but for only approximately one eighth of the acreage, the value per acre (including cotton seed) averaging about 75 per cent higher than that of corn. Wheat ranks above cotton in area occupied, but is fourth among the crops from the standpoint of value. These four great crops together cover about three fourths of the total cultivated land of the country, but since fruits, vegetables, and tobacco have a much higher value per acre, the share of these four in the total value is less, about five eighths.

In Fig. 48 the crops are shown on the basis of their value on the farm independently of the use to which they are put. A very different picture appears when they are considered from the standpoint of sales in general markets: hay almost disappears from the canvas, being mainly used on the farms that produce it; corn falls into a secondary position; and cotton comes into the foreground as a "money crop," the entire output, save a limited quantity of cotton seed, going to market.

Fig. 48 brings out the great importance of American animal husbandry. Crops which are used either exclusively or chiefly for feeding live stock account for five eighths of the total crop acreage and for 43 per cent of the aggregate value. The high dietetic standards of the people as regards the vegetable foods themselves are also indicated by the crop values, it being borne in mind that corn, despite its great production, is used but little for human food in the United

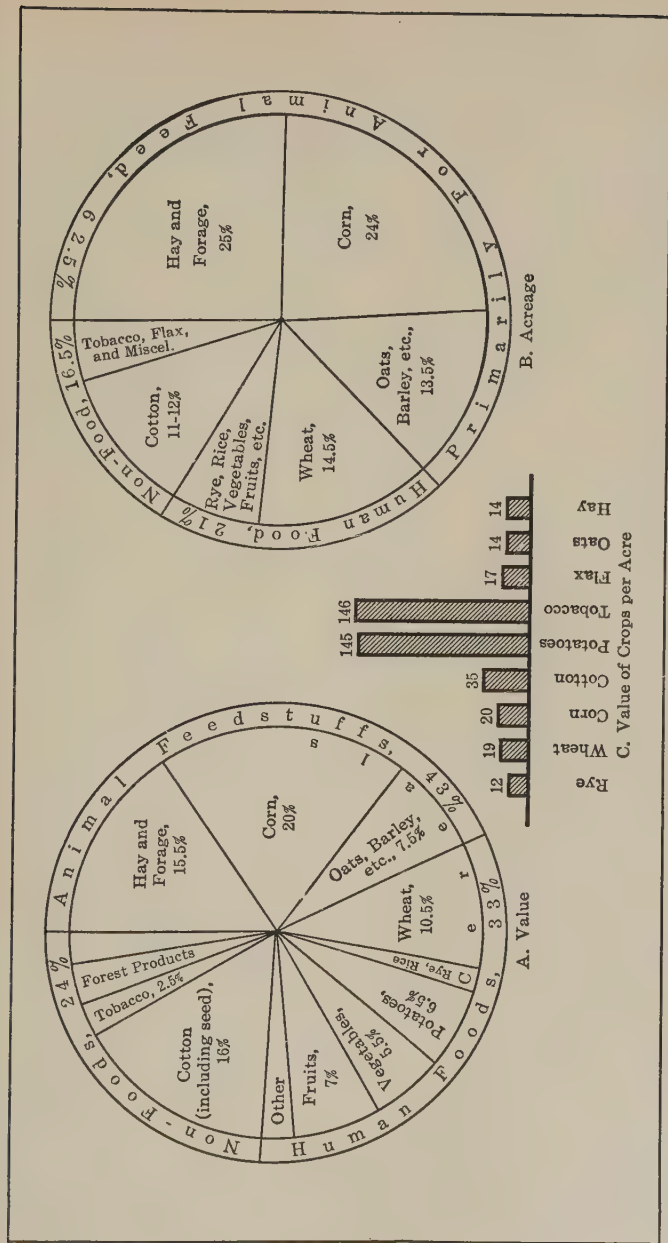


FIG. 48. Diagram showing the relative importance of the major individual crops as regards value and area of land occupied. Section A shows the percentage distribution of the total value of crops (including that of crops fed to farm animals), and section B the distribution of acreage. Section C shows the average value per acre, the figures at the ends of the bars representing the number of dollars. The data are averages for the two years 1925 and 1926, except those for average value per acre which cover the three years 1924-1926.

States. Wheat ranks as the only important bread grain. The "black bread" which makes rye a leading cereal of poorer countries like Russia, Poland, and even Germany is conspicuously absent from the American diet; indeed, the United States exports about half the relatively small quantity of rye it produces. Again, potatoes, which are an even cheaper food than cereals, rank much lower in American agriculture than in that of most European countries (Fig. 48 includes sweet potatoes and yams along with white potatoes). This fact is partly due to the extensive use of potatoes in some parts of Europe as food for animals, especially hogs, and for manufacture into starch and alcohol. Americans eat a good many potatoes, but not as many as most Europeans.

The reported figures of the value of fresh vegetables (apart from potatoes) and of fruits are somewhat understated; for where production is on a small scale, especially if it is chiefly for direct consumption by the farm family, it often fails to receive attention. In any case the value on the farm scarcely reflects the relative importance of vegetables and fruits in the budget of consumers, since, on account of their perishable character, the costs of transportation and marketing are higher than in the case of such a staple as wheat. Certain it is that in no other country do city consumers enjoy such a quantity and variety of these palatable and healthful foods as in the United States. Supplies are often drawn from great distances, and it may almost be said that "spring" vegetables and fresh fruits are never "out of season" in American markets.

Tobacco is an intensive crop, the value of the product per acre being several times higher than that of the cereals or even of cotton. It does not rank with the great staple food products or with cotton in American agricultural economy, but, on the other hand, there are only a few countries of the world, such as Cuba, Bulgaria, and Greece, in which tobacco plays a part of such relative importance as it does in the United States.

Animal Products

Each of the three great subgroups of animal products has a very large total value (see Fig. 49). The value of the animals raised (representing principally meat production) greatly exceeds that of any crop. The same thing is true of the value of dairy products. Poultry products rank above wheat in the farm economy.

In few other countries is there so nice a balance between the several branches of animal husbandry as is found in America. In most of the more thinly settled countries, such as Australia or Argentina, effort is concentrated chiefly on production of meat. Meat animals out-rank milk animals in a somewhat less marked measure in several of the coun-

tries of Europe. On the other hand, in Holland and Switzerland the dairy predominates, and in China poultry-raising is probably the most important branch of animal industry. In America meat production and milk production stand shoulder to shoulder, and the poultry industry is likewise very highly developed.

From the standpoint of the value of annual production, swine are half again as important in the farm economy of the United States as beef cattle, a fact partly due to the considerable export of pork products. As to dairy products,

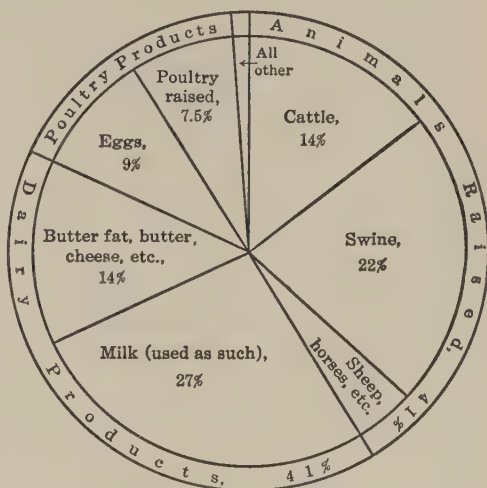
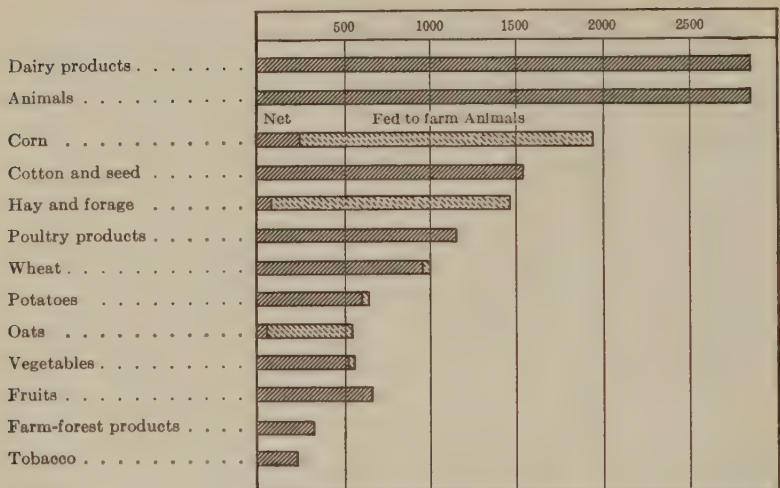


FIG. 49. Diagram showing the relative importance of the major animal products of the United States in value

The figures represent averages for the two years 1925 and 1926

VALUES OF PRODUCTS IN MILLIONS OF DOLLARS



Minor products, in order of gross value: barley, wool, grain sorghums, beans, sugar beets, rice, flax, rye, peanuts, sugar cane

FIG. 50. Diagram showing the relative importance of the major individual crops and animal products in value

The bars for feed crops, such as corn, show both the total value and the approximate value of that part which is not fed to animals on the farm (designated as net value). Potatoes include sweet potatoes. The figures represent averages for the two years 1925 and 1926

the most striking fact is the great value of the milk used or sold fresh. In Europe the proportion converted into butter and cheese is much higher; consumption of milk is especially small in cities and towns. In many foreign countries cheese is a more important article of diet than in America, but decidedly the opposite is true of butter.

Combined Ranking of All Products

The foregoing discussion has dealt with vegetable products and animal products separately. Looking at both together we may rank the individual commodities produced on American farms either according to their gross value or, very differently, according to their net value after deducting the crops fed to animals on the farm. There is a certain

lack of logic in comparing gross values; for example, in comparing cattle or hogs with corn, which is largely used to feed them. The data are shown in both ways in Fig. 50. The net values of feed crops are only approximations, since the quantities fed to animals are not known precisely. In particular it is uncertain whether corn, apart from its use for feeding farm animals, ranks above or below tobacco.

SECTION 5. THE GEOGRAPHY OF AMERICAN AGRICULTURE

As with many other countries, agricultural production in the United States is very unequally distributed over its surface. This is mainly the result of natural differences in productive capacity, but it is partly due to the newness of the country. With time and increase in density of population certain regions now little or not at all developed agriculturally will be brought into somewhat greater use. However, the period since 1900 has witnessed no marked change in the geographical distribution of agriculture despite an increase of over 60 per cent in the number of inhabitants, and it is hardly probable that any great shifts will occur in the future. Those areas which now produce little are subject to more or less serious handicaps of nature, and for the most part it would be harder to develop them into large production than to add to the output in the areas already more productive.

Net Value of Farm Products

Fig. 51 shows the general position of the nine geographic regions as regards agriculture.¹

¹ The method used by the writer in estimating the duplication from feeding crops to animals is as follows: For each division the reported farm value of hay, corn, and oats produced was taken as a basis. Although some of these are used for human food or are sold for use in cities, the value of this part is assumed to be offset, for most sections, by the feeding of other crops to farm animals. From the total value of these crops there were deducted in the case of the two North Central divisions the estimated value of corn and oats sold for farm use in other divisions, and for the three Southern divisions the estimated amount of corn used as human food, such use being relatively large in comparison with the corn crop of the South. To the figures for the Middle

The four central divisions, occupying the great valley between the Appalachians and the Rocky Mountains, stand in a commanding position in American agriculture, accounting for 60 per cent of the farm population and two thirds of the net value of crops and animal products. Their area is vast, and nowhere in the world does a stretch of surface equal in size present richer resources for farming. If to these divisions be added the South Atlantic division, which outranks all others in the number of farm population, over three fourths of the total agricultural activity of the United States is accounted for. New England and the Middle Atlantic division count relatively little because of their small size, and the two Western divisions rank low because of the large proportion of poorly watered land and because they are but newly settled.

The West North Central division, the largest of the nine great regions save one, leads all others in value of farm output, contributing one fourth of the national total. For this division the density of agricultural population and the average value of products per square mile would be much higher but for the strip along its western side where rainfall is inadequate. A great part of its area is fully equal to the East North Central section in productivity. The latter, well watered throughout, ranks a little below the West North Central in agricultural population and still further below it in value of farm products. The Southern divisions all stand high in the number of farm dwellers, and no very great difference in absolute numbers appears between the three, though the density of settlement is much lower in the

Atlantic, New England, and three Southern divisions were added the estimated purchases of feed by those divisions from the North Central divisions. The margin of error in the total value of products resulting from this method of estimating duplication is believed not to exceed appreciably the margin of error in the reported gross figures of value of crops and value of animal products. While this book was in press the Department of Agriculture (*Crops and Markets*, September, 1929) published a calculation of the net value (less duplication and seed) of crops and animal products by states and divisions. Its results confirm rather closely the estimates here presented.

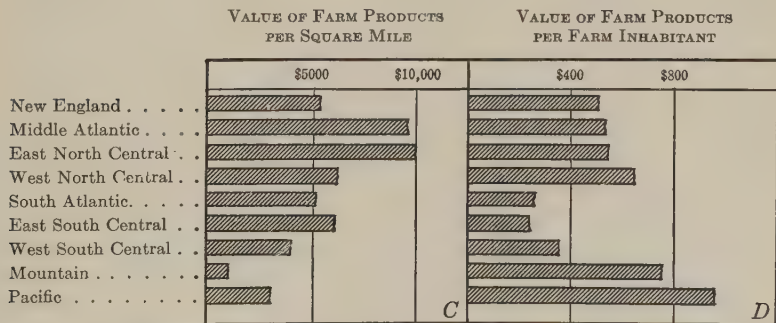
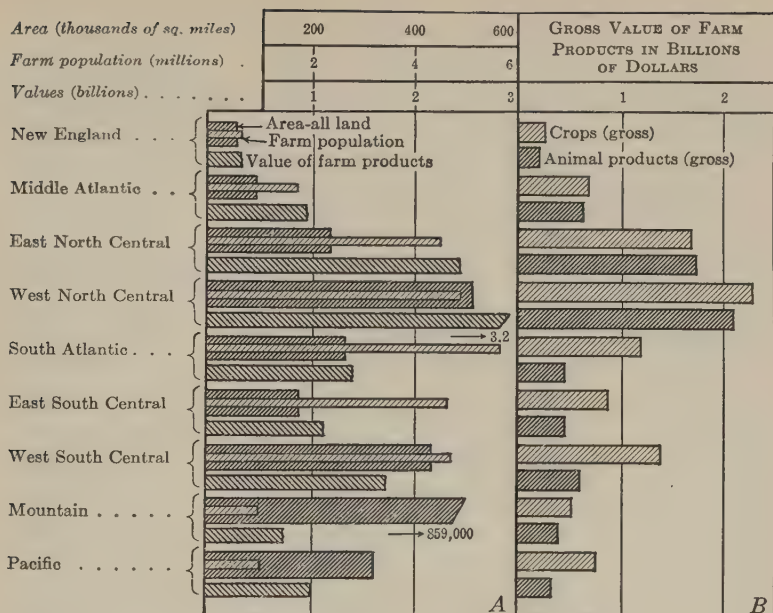


FIG. 51. Diagram showing the value of farm products by geographic divisions

In section A, the broad bar, measured by the scale at the top, represents the total area of the division (not that of farm land alone); the narrow bar, the population living on farms; and the separate bar below, measured by the lowest scale, the estimated net value of farm products, excluding duplication of crops fed to animals. The scales are so chosen that if the number of farm dwellers averaged ten per square mile and the value of products \$5000 per square mile, the three bars would be of equal length. Section B shows the gross value of crops and of animal products separately; sections C and D show the average net value of farm products per square mile of total area and per farm inhabitant (not per worker) respectively. The figures are averages for 1925 and 1926

West South Central division than it is farther east. No one of these divisions, however, equals the two North Central divisions in value of farm output; even the West South Central, which ranks third in this respect among the nine geographic divisions, falls below the smaller East North Central section.

Value of Products per Square Mile and per Farm Inhabitant

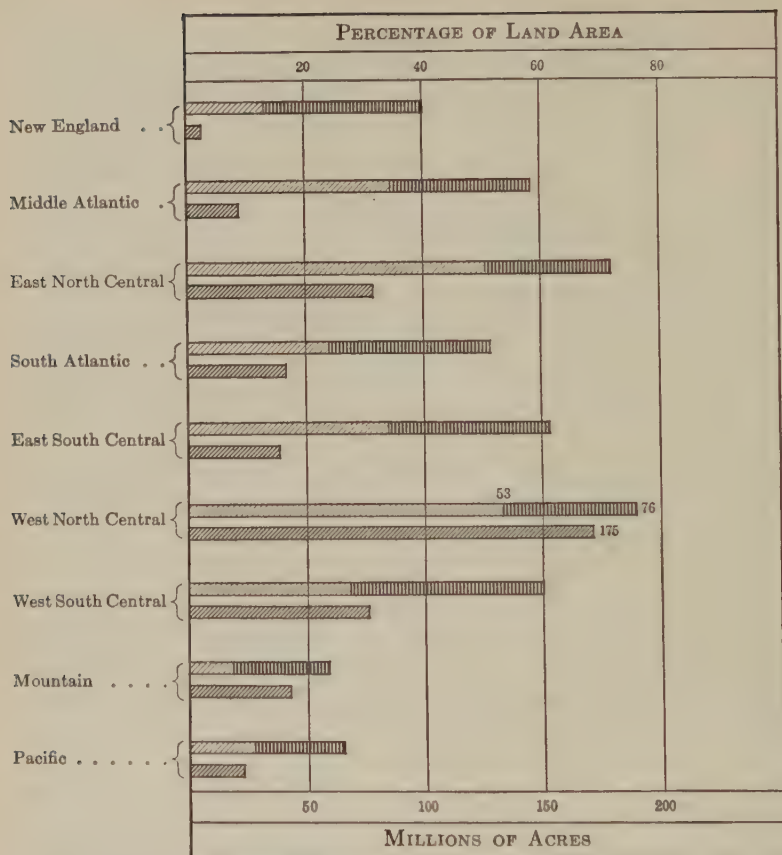
Very great differences appear between the several divisions with respect to the value produced per unit of their total land area (Fig. 51, C). The East North Central division forges to the front with farm products valued at more than \$10,000 per square mile; the Middle Atlantic comes next. The ratio falls to as low as \$900 in the Mountain division with its vast area of arid and semiarid lands. The variations among the divisions reflect differences in inherent productive capacity, in length of settlement, and in distance from markets; they are also materially affected by the efficiency of agriculture. The Middle Atlantic states attain their high position, despite very considerable areas of mountainous and rough land, by reason of their nearness to great consuming markets, and by reason of intensive operation, especially in the dairy and truck branches. The East North Central section has similar advantages in some measure, but it has, above all, exceptionally fertile lands. The South Atlantic and East South Central divisions, although perhaps not greatly inferior to their neighbors to the north in resources, get less out of their soil.

A very different picture appears when the divisions are compared as to value of farm products per farm inhabitant (Fig. 51, D). It is this ratio that is the most significant from the standpoint of the well-being of the agricultural population. Here the major influences are the type of agriculture, the amount of capital used, the efficiency of the farm workers, and the average size of families. The Mountain and Pacific divisions, which rank low in the aspects

thus far considered, lead all others in the value of output per farm dweller. The great stock ranch requires relatively little labor. The orchard of the Pacific coast may employ a large number of casual workers to pick fruit, but most of these are not counted by the census as living on farms. In the Far West the number of men materially exceeds that of women, and the proportion of persons in the more productive age groups is high, as is characteristic of regions in process of settlement. Lower average values per farm inhabitant are found in the South, especially east of the Mississippi. There farming is for the most part less advanced than in the North or the West, and the farm families number more children who contribute little to production. The four divisions of the North occupy an intermediate position in respect to the ratio of the value of farm products to the number of persons living on farms; the West North Central division stands considerably ahead of those farther to the east. Agriculture in the North is more diversified than in most parts of the South. This is evidenced, among other ways, by the larger part played by animal husbandry on the typical Northern farm. Fig. 51, *B*, brings out clearly the difference in this respect; its significance is more fully discussed in Section 7 of this chapter.

Proportion of Land in Farms and Proportion Improved

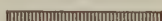
The differences in quality of land in the several parts of the country are reflected in the proportion of their total land surface occupied by farms and in the proportion of these farms "improved" (see Fig. 52). In the best agricultural states nearly all the land, except that required for cities and towns, roads, railways, factories, and similar purposes, has been taken up by farmers. This is true, for example, of Iowa and Missouri. In some other states there are large areas outside of farms: in forests, in public ranges, or in waste lands of mountain, swamp, and desert. The proportion of the total land surface occupied by farms is highest in the



Percentage of total land area consisting of
land in crops, fallow, or plowable pasture



Other land in farms (percentage)



Acreage of land in crops etc.



FIG. 52. Diagram showing farm land in the several geographic divisions

The first bar for each division shows what proportion of the total land area consists of improved farm land (that is, land actually planted to crops, lying fallow, or improved pasture) and of farm land of all classes, respectively; the second bar, measured by the scale at the bottom of the diagram, represents the absolute figures of the acreage of improved farm land. The data are for 1925

West North Central division, being somewhat more than three fourths. In the Mountain and Pacific divisions it falls to about one fourth; vast areas here are still in the hands of the Federal government or of "land-grant railroads." These public lands, so far as they are capable of producing, are used for stock-grazing or forestry, or for both these purposes.

The proportion of farm land improved — that is, actually planted to crops, or lying fallow awaiting planting, or in pasture previously plowed or readily plowable — also varies greatly. It depends, among other factors, on the quality of the land and the prevailing type of agriculture. The farm may contain, along with fertile land, some that is too steep, rocky, swampy, or sandy for advantageous cultivation. Some pasture is required in any case, and in good dairy regions pasturage may pay better than crops. In semiarid sections the farm may be devoted chiefly to grazing. When land is relatively abundant the farmer may prefer to keep part of it in the "wood lot," even though the value he gets from it may be low. As might be expected from its high fertility and the wide prairies of its western part, the East North Central division shows a larger proportion of its farms improved than any other — about seven tenths. This and the West North Central are the only sections in which more than half of the entire land surface consists of improved farm land. The proportion improved is lowest in rocky but densely peopled New England and in the Far Western divisions.

Value of Farm Products by States

Fig. 42, on page 328, shows, along with other data, the gross value of crops and the gross value of animal products by states. The combined net value, excluding duplication, is not given.¹ For most states the value of crops fed to farm

¹ See footnote on page 327. The text takes account of the estimates of the Department of Agriculture there mentioned.

animals lies somewhere between 40 and 60 per cent of the value of animal products. From the standpoint of the absolute value of farm output the four leading states are Texas, Iowa, California, and Illinois, and New York, Ohio, Wisconsin, Missouri, Minnesota, Kansas, and Nebraska crowd one another rather closely for the next rank. Comparisons with reference to the ratio of the value of products to area and to farm population would, of course, show very different ranking.

SECTION 6. FARMS IN THE SEVERAL SECTIONS OF THE COUNTRY

In the character of the agricultural industry and in the life of the farm population there is much that is common throughout all sections of the United States. Everywhere the relative abundance of land stamps its imprint. More or less extensive methods prevail in every section save in those special cases where by the nature of things intensive application of labor and capital is essential. Throughout the country the "one-family" farm is dominant. None the less the diversity of natural and social conditions over so vast an area results in some rather conspicuous differences in agricultural practices and in the situation of the farming class. Some of the most important of these differences are brought out in Fig. 53, which shows the average size of farms and the average value of products per farm. These averages gain a special interest from the fact that the large majority of those who till the soil are themselves operators of farms, either as owners or as tenants. The economic status of the bulk of the rural population is fairly measured by the average net value produced by the farm unit. Comparisons between the sections are the more significant because there are not great differences between them as to the expenditures made by the average farmer in producing his output. The outlay of the typical farmer for hired labor and fertilizers, the two principal items, is in no geographic division

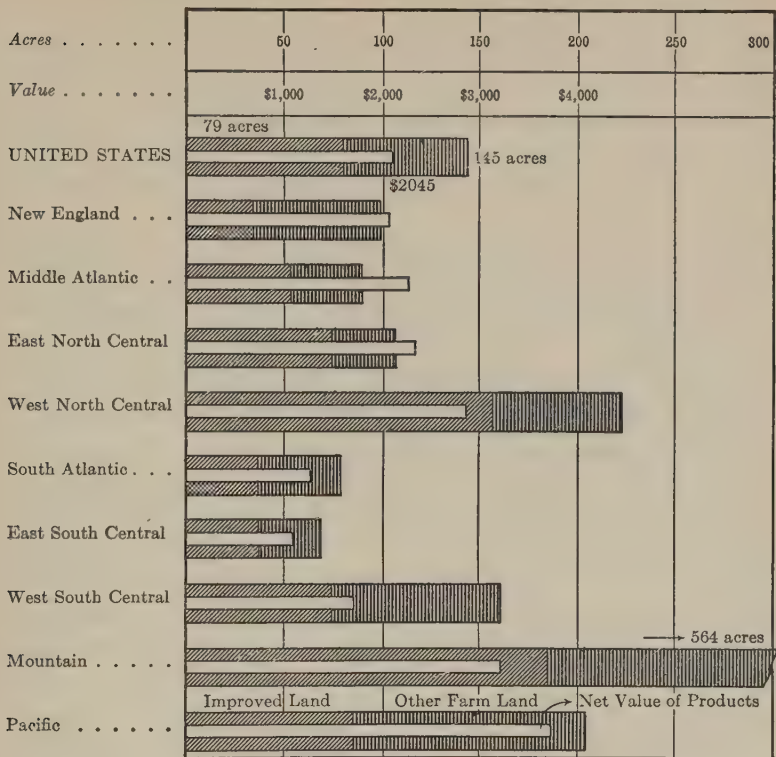


FIG. 53. Diagram showing the average size of farms and the average net value of products per farm, by geographic divisions

The broad bar, measured by the upper scale, represents the average total acreage and the average acreage of improved land per farm; the narrower bar represents the average net value of products per farm, excluding the duplication of crops fed to farm animals

a major fraction of the value of what he produces; in the United States as a whole that fraction is only 8 or 9 per cent.¹

The diagram brings out the relation between the amount of land (especially of improved land) in the average farm and the value of its products. This relationship is by no means uniform throughout the country. Some crops require

¹ The considerable sums spent for feed have already been taken into account in calculating the net value of products (see footnote on page 373).

more labor and give a greater value per acre than others, and some lands are inferior so that a greater area is required to produce a given value. Nevertheless, in general the size of his farm has much to do with the value of the farmer's output.

Farms of the North and the West

In the North the farms become gradually larger, both in aggregate area and in area of improved land, as one moves from east to west, until approximately the hundredth meridian, bisecting the second tier of states west of the Mississippi, is reached. This progress in size is due partly to the greater ease of cultivating the land as it becomes more level and freer from stones, and partly to the fact that states farther west were settled after the invention of modern machinery made it possible for one man to farm more land. The average value of products per farm also increases as we proceed westward from the Atlantic, but in much less marked degree, and this for several reasons: the greater intensiveness of operation on many Eastern farms, their nearness to central markets, and the fact that they pay out relatively more for labor than farms farther west.

To the west of the hundredth meridian, along the border of the West North Central division and in the Mountain section, farms are much larger still in total area; and, although so much of the land is used for grazing, there is even somewhat more improved land per farm than in the Middle West. This is partly because there are still a considerable number of huge ranches, but chiefly because inadequate rainfall makes the land less productive. Notwithstanding this inferiority the difference in size is so great that the average value of products per farm is somewhat larger in the Mountain division than in the West North Central. It should be borne in mind that part of the value of agricultural products in the Far West is derived from land not in farms at all but in public ranges; this part cannot be segregated and is necessarily included with the average value assigned

to each farm. On the Pacific coast the average size of farms loses much in significance because it possesses both a good many huge ranches and large numbers of small intensive fruit orchards and truck farms. Here the average value of output per farm reaches its maximum, but partly by reason of the exceptionally large expenditure for hired labor.

Farms of the South

The most conspicuous of the sectional differences in farm conditions is that between the North and the South. Except in western Texas and Oklahoma, which resemble the dry plains farther north in the same longitude, farms in the South average much smaller than in the typical Northern farming regions. The "one-mule farm" is a widespread phenomenon. The average farm in the West North Central division has six horses (or mules); in the East South Central the ratio is two for each farm. Although the average value per acre of cotton is materially higher than for most Northern crops, and that of tobacco far higher, the farms are so much smaller and the yields of such crops as hay and corn and oats so much lower that the average gross income per farm is decidedly less in most parts of the South than in the northern sections of the country.

Apart from the natural influence of denser population on the size of farms, there are other factors which go to explain the relatively small magnitude of Southern holdings. Most of the South is of earlier settlement than the agricultural regions of the Middle West, and many one-family farms were established before machinery made larger units of this type possible. Again, the tenant holdings are for the most part parceled out with a view to enabling the tenant and his family to do all the work without hiring labor at any time of year. This practice is tied up with the dominance of the cotton crop. During the picking season the area which any family can care for is decidedly limited. Inasmuch as great numbers of workers must be at hand for the

harvesting of cotton they keep themselves busy at other seasons by doing, without very great use of animal power or of other equipment, what could be done by a much smaller number using the most modern methods. The invention of a satisfactory cotton-picking machine would revolutionize Southern farming, though its immediate effect in certain regions might be disastrous to many of the present workers, who would cease to be needed.¹

SECTION 7. THE PRODUCTS OF THE SEVERAL DIVISIONS

The Causal Factors at Work

In a country of the magnitude and natural diversity of the United States one would expect marked variation from region to region in the character of the agricultural products. Climate and soil are powerful factors in determining what crops a given section shall raise. Tradition, however, has something to do with it. Of much importance, too, is the geographic distribution of the consumers, whether they be human beings or domestic animals. This latter factor works in complex ways.

Some farm products lend themselves to transportation much more readily than others. Highly perishable products dread movement. Commodities dear in proportion to their bulk or their weight can afford to pay more transport charges than those of low value. Each section naturally aims to produce, if it can, enough to supply its own needs of those agricultural commodities which are difficult or costly to transport. If, owing to a dense urban population, its requirement of such commodities is large, it will tend to devote a great proportion of its soil to producing them and will rely on other sections to furnish it what is more readily transported. In the United States, to be sure, with its

¹ In the western part of the cotton belt, in Texas and Oklahoma, farms are larger, and rather crude cotton-picking machinery has recently come into common use.

high standards of living, the people are prepared to pay transport charges that in many countries would be virtually prohibitive.

Illustrations of these general principles are familiar. For example, the farm itself is a great consumer of farm products. The work animals are big eaters, especially of the bulkiest of all crops, hay ; consequently, hay is a crop raised everywhere. Each region seeks to raise for its draft animals enough even of oats and corn, although the unit value of these is considerably higher. Among the major crops used for human food the potato lends itself least readily to transportation. Potatoes (or sweet potatoes) are therefore raised throughout the country, and where population is dense a very considerable fraction of the land is devoted to this crop. A still more striking illustration is furnished by fresh milk, which cannot stand long hauls. Each region aims to supply its local needs, and near the great population centers a large part of the land is given over to pasture for dairy cows or to raising hay for their feed in winter. On the other hand, wheat and cotton are nonperishable and of unit value high enough to bear the cost of long hauls. Meat, under modern methods of refrigeration, is in a similar case. The farmers are much freer in their choice of location for producing these and freer to take advantage of any favorable conditions of soil and climate. These products shun thickly peopled sections where the land is needed for commodities more difficult to transport.

It should be borne in mind that the question where a given product shall find its seat is one of relative, not absolute, advantage in costs. New York could perhaps grow wheat cheaper than North Dakota. But the difference in cost would be less marked than in the case of potatoes : to produce potatoes in New York costs much less than to produce them in North Dakota and bring them to New York. So New York chooses the crop that will save it the most, and leaves the wheat to North Dakota.

*The Relation between Vegetable Products and
Animal Products*

With these general principles in mind it becomes possible to understand the differences between the several sections as to the character of their farm products. Attention may first be called to the relative importance of animal products as compared with those of vegetable origin (see Fig. 51, *B*, on page 375). In the country as a whole the gross value of crops (not deducting those fed to animals) is about 40 per cent greater than that of animal products; but in the four divisions of the North, taken together, vegetable products scarcely exceed animal products in value, and in one of them — the East North Central — the balance even tips the other way. The explanation lies in the excellent pastures of the North, in the great demand of the industrial centers for fresh milk, and in the extraordinary adaptation of the Corn Belt for meat production.

In marked contrast stands the "land of cotton." Although stock-raising is of no small importance in Maryland, Virginia, and Kentucky and on the plains of Texas and Oklahoma, it is so little developed in the cotton-growing regions that in the South as a whole the value of animal products is considerably less than half as great as that of vegetable products. This fact is partly due to the inferiority of Southern pasture and to the relatively low yields of corn, the principal food for fattening animals. Moreover, animal diseases and pests are often obstacles. Whether, if the Southern farmer were to cease thinking of cotton as the main aim of his activity, it would prove desirable to develop animal husbandry on a large scale it is difficult to say.

A marked change has taken place during recent years in the Mountain division. Once its land was confined almost wholly to grazing cattle and sheep; in winter the animals fended for themselves as best they could. Now considerations of humanity as well as of profit demand the feeding of hay in winter. Irrigation and dry farming have made it pos-

sible to raise not only hay but other crops in considerable quantities. Consequently the value of crops in the division is now materially greater than that of animal products. On the Pacific coast the ratio of animal to vegetable products falls fully as low as in the South, but this is due to the exceptionally high value of the output of intensively cultivated orchards and truck farms rather than to neglect of stock-raising.

The Individual Products of the Divisions

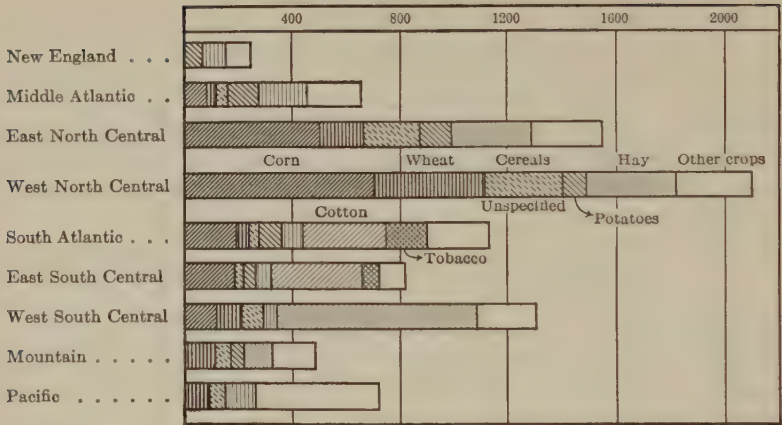
Fig. 54 shows for each division the absolute and relative value of the principal crops. In most of the divisions the group "Other cereals" consists principally of oats, but in the West South Central section rice is more important than oats, and in the Pacific section barley outranks oats. "Other crops" represent a varied assortment; in almost all sections the two major items are fruits and vegetables; in several sections farm-forest products are of importance. In this group also are beans, flax, grain sorghums, peanuts, sugar beets, and sugar cane, each of which is a specialty of a few states.

The number of all cattle, of dairy cows, and of swine is shown by geographic divisions in Fig. 57.

New England and the Middle Atlantic States

New England and the Middle Atlantic division, with their great cities, go in for bulky or perishable products: for potatoes, hay (to feed the rapidly disappearing city horse and, much more, the dairy cow), small fruits, and fresh vegetables. The Aroostook valley of Maine is peculiarly favorable for potato culture. Local conditions favoring certain types of that most finicky of plants, tobacco, explain the considerable planting of this crop in Connecticut, Massachusetts, and Pennsylvania. In New York apples and grapes are of much importance. Both in New England and in the Middle Atlantic division a big fraction of the land is used to pasture cows.

A. VALUES, IN MILLIONS OF DOLLARS



B. PERCENTAGES OF TOTAL VALUE OF CROPS

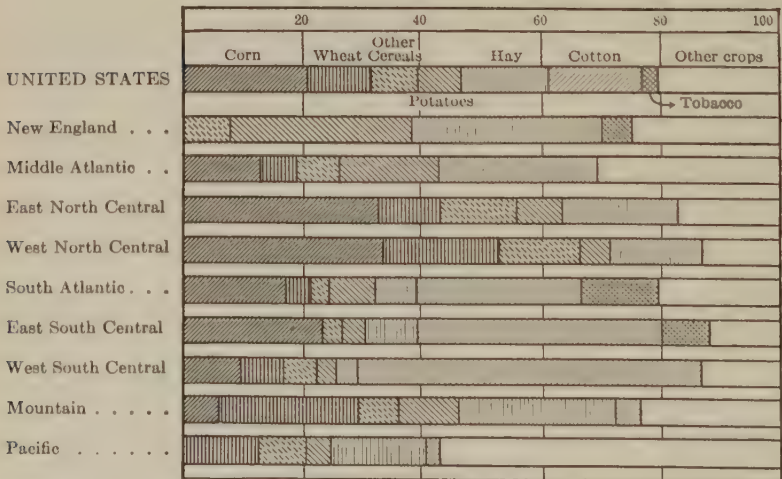


FIG. 54. Diagram showing the values of the principal individual crops of the several geographic divisions

Section A shows the absolute values and section B the percentage which each crop contributes to the total. Crops which in the given division are unimportant are not shown separately (especially in certain bars of section A), but are included either under cereals unspecified ("Other cereals" in section B) or under "Other crops." The figures represent averages for several recent years

The North Central Region

The East North Central and West North Central sections, which rather closely resemble each other, are the great centers of the production of cereals and meats. Since their own population is of only moderate density, especially toward the west, these divisions have a capacity for turning out a vast surplus of the readily transportable products. The Corn Belt, a wide band across the middle of these sections, is better adapted for the cultivation of corn than any other area in any country, and produces not far from half the total output of the world. Corn accounts for about one third of the total value of crops in each of the two North Central divisions. The great bulk of it is fed to beef cattle and hogs.

Wheat also ranks high in these divisions, especially in the West North Central. That it falls so much below corn is due to the fact that the high standards of living of the United States call for relatively less bread and more meat than appear in the diet of most other countries; even as it is, a large fraction of the wheat of the Western prairies must find its market abroad. The large use of farm horses and mules is reflected in the high rank of oats (included under "Cereals unspecified") and hay among the crops of this region. The dairy industry is important in the two North Central divisions, especially to the north of the Corn Belt. Wisconsin and Minnesota supply cheese and butter in great quantities to the Eastern markets, and from all the states of the East North Central division a great amount of milk goes to its large industrial centers.

The Mountain Division

In the character of its crops the Mountain division more nearly resembles the West North Central than it does any other part of the country. It differs conspicuously, however, in being ill adapted for corn. Hay is the largest single crop, a situation not paralleled in the Central states nor in the

South. Wheat ranks second in importance. The cotton culture of the Mountain division is confined to irrigated lands in New Mexico and Arizona. The most important "Other crops" are fruits and vegetables from irrigated valleys, sugar beets, and beans. The leading agricultural product of the Mountain division is meat animals — cattle and sheep. Although the carrying capacity of the ranges is low, their area is so vast that this section accounts for one sixth of the cattle (apart from dairy cows) in the whole country and for more than two fifths of the sheep.

The South

The dominance of cotton in the agricultural economy of the South is a striking phenomenon. In no other section of this country, and in few other countries, does any single crop contribute so large a share of farm income. In the West South Central division cotton accounts for nearly three fifths of the aggregate crop value. In large areas of the South cotton is the only money crop of consequence, a position in some measure dictated by the extraordinary fitness of this section for that great staple, but one that involves risks to the farmer, both from crop failures and from variations in prices. In most of the Southern states corn is the principal cereal; it is chiefly consumed locally. The climate in a large part of the South is too moist for wheat, but wheat is important in the states just south of the Potomac and the Ohio and in Texas and Oklahoma. Hay plays a smaller part in Southern farming than elsewhere because the milder climate permits animals to graze most of the year. Tobacco is confined to limited areas possessing peculiar soil qualities, but it is the major money crop in those areas. In the South Atlantic division it ranks third among the crops in point of value.

The South Atlantic division is developing a large orchard and truck-garden business for supplying the great cities of the North, especially at the season when they are unable to draw fruits and vegetables from sources near at hand. The

citrus-fruit industry of Florida and the peach industry of Georgia are especially notable. Fresh vegetables are also of increasing importance in the South Central divisions. Other Southern crops of some importance are peanuts (particularly in the South Atlantic section), grain sorghums (used for animal feed) in the Southwest, and sugar cane in Louisiana.

The Pacific Coast

The Pacific division is radically different from all the others. What are major crops elsewhere take second rank here. Fruits play the leading rôle, and fresh vegetables assume an importance which is scarcely equaled elsewhere. The explanation lies chiefly in the mildness of the climate, which makes it possible to grow certain fruits for which most other sections are unfitted and to supply other fruits and vegetables out of season. The immense development of this branch of agriculture on the coast would have been out of the question, however, were not the buying power of the American people strong enough to afford the cost of long-distance transportation of fruits and vegetables, necessarily high despite the remarkably efficient methods of carriage that have been introduced. The absence of corn is characteristic of Pacific-coast agriculture. Wheat, barley, oats, hay, and potatoes are important crops, however. The dairy and beef-cattle industries are well developed.

SECTION 8. MAJOR INDIVIDUAL CROPS

Earlier sections have afforded a general view of the position of the principal products in the agriculture of the country as a whole and of its great geographical regions. It remains to consider briefly each major product separately, particularly those which enter into general commerce. We may pass over hay, for the reason that although a great area is devoted to it in most parts of the country, it is used chiefly on the farm itself.

Corn

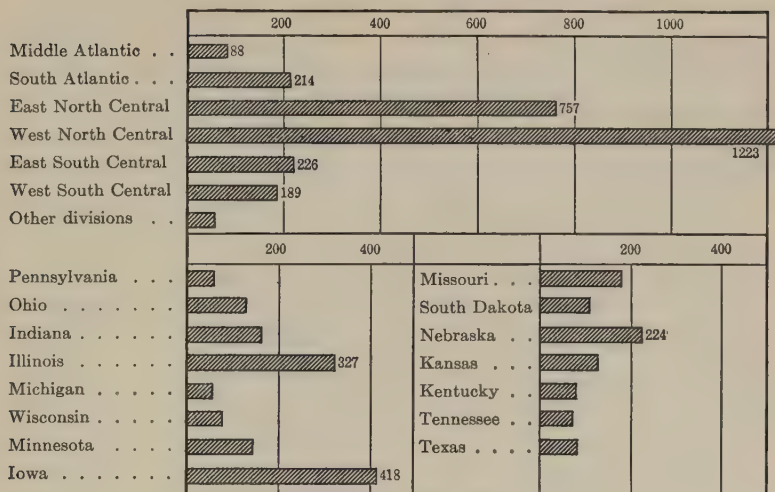
The crop of greatest value is corn (maize). Three fifths of the corn of the world is grown in the United States, and yet corn ranks far below cotton or wheat as a direct money crop. Probably not over one tenth of the output reaches central markets and not over one twentieth enters into human consumption; in recent years exports have been less than 1 per cent of the quantity produced, Argentina being a far more important supplier of foreign markets. Corn owes its position in American farm economy to its peerless qualities for feeding animals and to the high meat consumption of the country. Much corn goes to horses and mules, especially in the South, and some to dairy cows; but by far the greatest use is for fattening beef cattle and hogs. Of the amount so employed more than half is fed on the same farm which raises it.

Corn is a widespread crop (see Fig. 55) except in New England and the Far West, but production is heavily concentrated in the Corn Belt. Iowa and Illinois alone raise nearly three tenths of the total. Yields per acre are higher in the Corn Belt than in most other regions. In any section where corn grows well it not only creates more food value per acre than any other cereal crop, but also usually pays better returns, despite the fact that it requires tillage during the growing season, as the other grains do not.

Wheat and Rye

To the white race, bread is the staff of life. Even in the United States, with its liberal use of meat and milk, bread ranks first among foods in the amount of nourishment afforded, though not in cost. Wheat is the only bread cereal in general use in the country, rye bread being eaten only occasionally by way of variety. The United States leads the world in wheat production, although in the combined output of the two major bread grains it falls below Russia, with its larger population and the greater part played by bread in

CORN: PRODUCTION, IN MILLIONS OF BUSHELS



WHEAT: PRODUCTION, IN MILLIONS OF BUSHELS

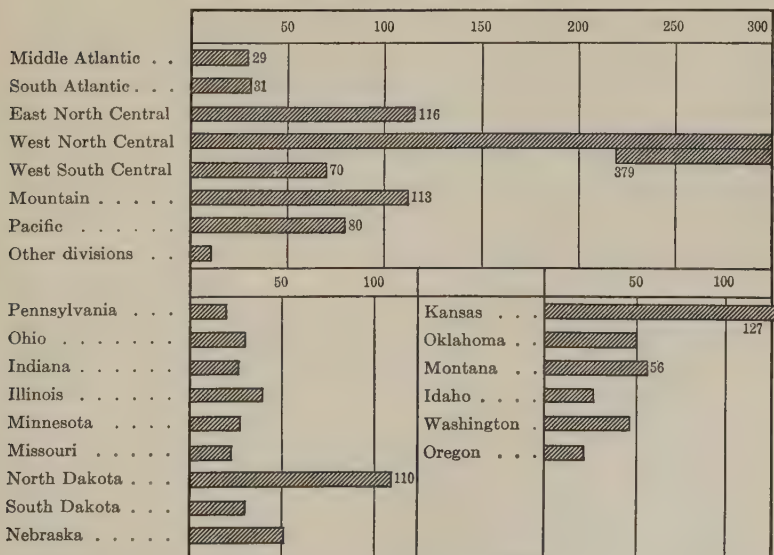


FIG. 55. Diagram showing the production of corn and wheat by principal geographic divisions and states

The figures represent averages for 1923-1928

the diet. The United States also long ranked as the largest wheat exporter. For some time before the war, however, it yielded first place to Russia, which sent its wheat out and ate its rye at home; latterly, with Soviet Russia a much smaller factor, Canada has outstripped all other countries in shipments to hungry Europe. The United States is a fairly close second; it still sends abroad about one fourth of its wheat, in the form of either grain or flour.

Wheat flourishes almost everywhere save in the South; in fact, it is an important crop in many states (see Fig. 55). However, since it is easily transported, and since in many sections corn, potatoes, or pasturage is more profitable, farmers have come to concentrate a large fraction of the wheat production in regions distant from central markets. Wheat acreage is densest in North Dakota and in western Kansas; other leading states are Oklahoma, Montana, Nebraska, Washington, Illinois, and Ohio.

Rye grows well wherever wheat thrives. However, owing to the fact that the present output is largely a heritage from the war and that the war stimulus naturally exerted its influence on acreage chiefly in the newer states, the production is even more concentrated geographically than that of wheat. The bulk of it is grown in North Dakota (from one fourth to one third of the total), Minnesota, Nebraska, Wisconsin, Michigan, and Indiana. About half the crop is exported, on the average.

The milling of wheat and other grains is fortunately a relatively inexpensive process. Although the milling industry ranks about twelfth among the manufacturing industries of the United States in gross value of output, it ranks far lower in the number of persons employed and in the value added to materials by the process of transformation, the cost of the grain and other materials representing seven eighths of the value of the finished products. As is still the case in many countries, flour mills in America were formerly small concerns, situated for the most part in the localities where the flour was to be consumed. The grinding of wheat

is now done chiefly in big mills, with saving in cost and with improvement in the quality of the flour. Some of these mills are at market centers not far from the main areas of production, as at Minneapolis, the greatest milling city of the world, and at Kansas City; others are found in the large consuming centers throughout the country. Even the wheat farmers themselves often use flour brought back to them from mills some hundreds of miles away. About one tenth of the flour output is exported, shipments of wheat in that form being on the average about half as great as those of the grain itself and remaining much more nearly uniform from year to year. In ordinary milling about seven tenths of the wheat goes into flour, the outer portion serving chiefly as feed for animals. Considerable quantities of wheat are used for making breakfast foods.

Other Cereals

Oats serve mainly as food for horses and mules, and hence they are widely grown, though about three fourths of the crop is in the two North Central divisions. Some 4 or 5 per cent of the oats produced are used for human consumption, chiefly in the form of meal for breakfast use. Exports are of relatively little importance. Barley serves chiefly for feeding animals and for making beer, though some is used directly as human food. Prohibition has cut down one major demand; but with other uses and increased export, the production of the United States is somewhat greater than before the war. The distribution of the plantings is fairly wide except in the South. The leading states are the Dakotas, Minnesota, and California; California sends a great part of its barley to Europe by water. The grain sorghums (Kafir corn, milo maize), which are especially resistant to drought and well suited for animal feed, have become of very considerable importance in the agriculture of the Southwest. Rice is the great cereal food of the Orient, but is of rather minor importance in American production and consumption. Its culture is confined to Louisiana, Arkansas, Texas, and California.

Potatoes

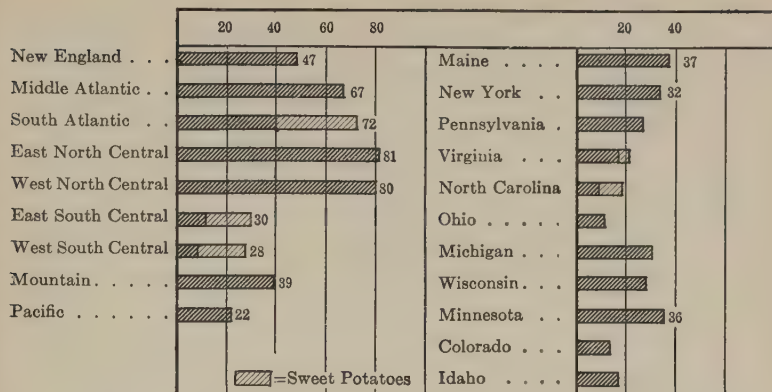
Next to wheat the lowly potato is the most important vegetable food of the United States, as of most European countries. It has the great merit of producing, at the cost of a considerable but by no means prohibitive application of labor, a large number of food units (calories) per acre. The appeal of cheapness is less strong in America than formerly, or than elsewhere; but the palatability of the potato and the influence of long habit make for large consumption. In the South the sweet potato in part replaces the white potato in the common diet. In Europe many potatoes are fed to animals, especially swine, or are used for manufacturing alcohol or starch, but neither of these practices is very common in America.

For reasons already mentioned, potato production, including that of sweet potatoes, is more widely distributed than that of any other crop (see Fig. 56). The preference of the white potato for a cool climate is suggested, however, by the fact that all six of the states with largest production lie along the northern border of the country, from Maine to Minnesota. Potato yields often vary sharply from year to year with weather conditions, and since they cannot be carried over to a second season the prices of potatoes react violently. Usually a big crop brings smaller aggregate receipts to the farmers than a scanty crop.

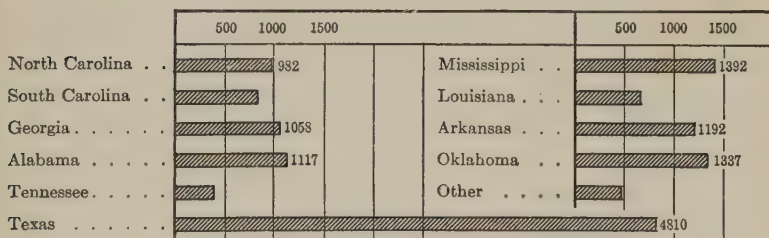
Vegetables and Fruits

Fresh vegetables, considered as a group, rank among the first half-dozen items in the food expenditure of the average American family. The number of varieties used is great; most important perhaps (named without reference to rank) are peas, beans, green corn, asparagus, tomatoes, cabbage, cauliflower, lettuce, celery, and melons. All these, and, indeed, most other vegetables which reach American tables, can be grown in almost any section of the country. Farmers

POTATOES: PRODUCTION, IN MILLIONS OF BUSHELS



COTTON: PRODUCTION, IN THOUSANDS OF BALES



TOBACCO: PRODUCTION, IN MILLIONS OF POUNDS

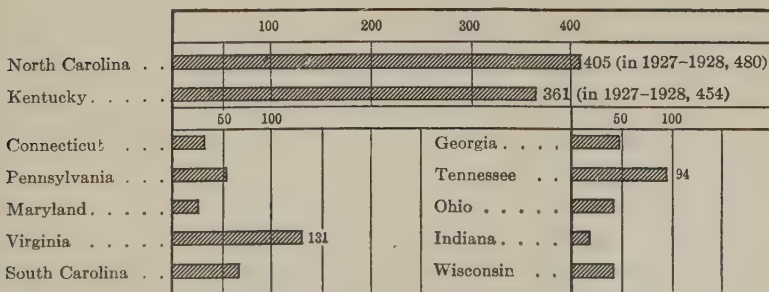


FIG. 56. Diagram showing the production of potatoes (including sweet potatoes), cotton, and tobacco by principal geographic divisions and states

The figures represent averages for 1923-1928

largely supply their own needs from the home garden. The markets of the big cities draw chiefly from specialized truck farms, in many cases situated close by. However, with the modern methods of fast transportation, and with the ability of American consumers to pay liberal prices, truck-raising is increasingly free to seek localities specially adapted by nature, such as California and the South Atlantic coastal plain. Ability to furnish vegetables at seasons when they cannot be grown in the North counts strongly in this development.

Fruits fall into two main groups: those of the temperate zone and those which demand the warmth of tropical or semitropical suns. Apples, peaches, apricots, pears, plums, and berries are the major items of the first class. These are widely grown for local consumption, but central markets receive most of their supplies from limited areas specially favored by soil and climate. For apples such areas are found particularly in New York, in the Appalachian foothills of Pennsylvania, Maryland, Virginia, and West Virginia, and, above all, on the northern Pacific coast. The leading state of the East for peaches is Georgia, and for pears New York; but the Pacific coast is dominant in both these fruits, as well as in apricots and plums (the latter including prunes). Much of the Western output reaches general markets in fresh form, but the major portion is canned or dried. Grape culture is even more restricted: the softer Eastern grapes come chiefly from western New York and the coast of Lake Erie, and the firmer grapes — used fresh, or dried as raisins, or pressed for grape juice and wine — come almost exclusively from California.

Tropical and semitropical fruits appeal increasingly to American consumers. Of citrus fruits the country produces an abundance for its needs and exports a considerable quantity, notwithstanding that the growing area is substantially confined to Florida and southern California. Bananas demand an even hotter climate, and for these the United States relies on importation from Central and South America.

Pineapples can be grown in certain limited areas within the continental confines of the country, but the bulk of the demand is supplied from the outlying territory of Hawaii.

Sugar

The United States consumes nearly one fourth of the sugar output of the world. Its annual sugar bill is approximately \$600,000,000; for each person the consumption averages about one hundred and ten pounds yearly. The country could easily, through the sugar beet, supply its own requirements, but beets call for so much toilsome hand labor that it chooses to rely chiefly on imports. From one sixth to one fifth of the total consumption is produced within the continental borders of the United States, about three tenths comes from outlying possessions (Hawaii, the Philippines, and Porto Rico being all big producers), and the rest is brought mainly from Cuba. A relatively small quantity of cane sugar is produced in Louisiana. The remainder of the domestic output is from beets, raised principally in the Far Western states.

Cane sugar is imported in crude condition and refined within the country. The refineries are huge plants, and without exception are situated on tidewater so that vessels can discharge directly into them. New York Harbor leads in this business. The process of refining adds a little more than one cent a pound to the price of sugar. Sugar beets are converted directly into refined sugar in factories invariably situated close to the areas of beet production.

Cotton and Cotton Seed

Apart from foodstuffs the principal vegetable products of world agriculture are textile fibers, rubber, and sundry vegetable oils which serve in part as food and in part for making soap, mixing paints, and other technical purposes. Many of these products are of tropical or semitropical origin,

and the United States raises but few of them. The importance of American cotton, however, is so great that in few countries do nonfood crops contribute so much to the farm income. Cotton has become much the most important material of clothing, and it ranks with wheat, corn, and rice among the crops of the world in point of value. Moreover, in the United States cotton is by all odds the leading money crop. It represents about one fourth of the net value of all crops after exclusion of those fed to animals.

The United States supplies well over half of the cotton crop of the world, the other leading producers being India, Egypt, and China. Considerably over half the American output is exported. Of recent years there has been a great expansion of cotton-planting in Texas and in Oklahoma. These two states now possess about half the total acreage. Whereas farther east the production is largely on "one-mule farms," the Western expansion has been in great part on larger farms making more use of machinery (see Fig. 56). Cotton producers have suffered severely (and in large areas still suffer) from the boll weevil, but changes in methods of planting, a considerable shifting of the cotton area to cooler and drier sections, and various direct attacks upon the weevil, have done much to combat this destructive pest. The change in fashion demanding less cloth in the garment, together with the swift growth in the use of rayon, have been factors hostile to expansion of the demand for cotton during recent years. Moreover, there is some growth in competition from other cotton-raising countries. The chief source of difficulty for the older states of the South, however, appears to be the greater cheapness of production on the Western plains.

American exports of cotton go chiefly to the industrial countries of western Europe, with England and Germany well in the lead as markets. Recently there has been a large increase in exports to Japan. Of total foreign sales from the United States during the three years 1926-1928 Great Britain took 22 per cent, Germany 24 per cent, France

10 per cent, Italy 8 per cent, Japan $14\frac{1}{2}$ per cent, and other countries about 22 per cent.

The cotton plant produces seed weighing about twice as much as the fiber, which is the main goal of the culture. The seed, separated by the process of ginning, was formerly largely wasted or, at best, used for animal feed and for fertilizer. A great part of it is now pressed for its valuable oil, leaving as a by-product oil cake, or oil meal, which is excellent for feeding cattle, especially dairy cows. The value of cotton seed on the farm is now reckoned to be over one seventh that of the lint cotton. Cotton oil is used both for food and for technical purposes. Much of it is converted by a process of hydrogenation into a semisolid greatly resembling hog lard in appearance and in uses.

Tobacco

Tobacco ranks fairly high among American money crops, and the increasing use of cigarettes throughout the world has enhanced its importance to the farmers in the limited regions where it is grown. The country produces about one third of the world's total and exports approximately two fifths of its output.¹ Exports are principally in raw form, partly because each country is disposed to prefer its own methods of manufacture, but mainly because of legal restrictions connected with the universal practice of extracting a large government revenue from the consumption of tobacco.

Tobacco requires intensive cultivation and much care in harvesting and curing; the value per acre is therefore high. Differences in soil and climate, scarcely capable of definition, cause great variations in flavor, and different methods of curing add further to the multiplicity of types and grades. The principal types grown in the United States for domestic consumption are "bright flue-cured" (mainly used for

¹ The proportion cannot be determined by comparing exports with farm production because of the loss of weight in curing. It is shown approximately by comparison with the weight of tobacco used in domestic factories.

cigarettes), burley (largely for pipe and chewing tobacco), and cigar tobaccos. Of these types the first is exported in large and increasing volume. In addition there are several varieties raised chiefly for export. Foreign markets differ greatly among themselves as to the character and quality of the tobacco they demand. From the standpoint of value the states which lead in the tobacco culture are, in approximate order, North Carolina (which accounts for roughly two fifths of the total), Kentucky, Virginia, Tennessee, South Carolina, Georgia, and Connecticut (see Fig. 56). The output is increasing fastest in the Carolinas and in Georgia; these produce chiefly the cigarette types, for which demand is swiftly advancing, both in the United States and in foreign countries.

Miscellaneous Crops

Aside from cotton seed, the only important oil-producing crops of the United States are flaxseed (also known as linseed) and peanuts. Some oil is also extracted from corn. The country raises flax practically for its seed alone; the labor of preparing the fiber for textile use is so great that the task is left chiefly to the countries with lower wages. The demand for linseed oil as a basis for paints is so large that the United States imports much flaxseed from Canada and Argentina. The domestic culture is principally confined to the Dakotas, Minnesota, and Montana.

Peanuts, used in other countries chiefly for extracting oil, are in the United States also employed directly as food. The South Atlantic states lead in this crop, smaller quantities being raised elsewhere in the South.

Beans (dried) are eaten in fairly large quantities in the United States. The general markets are supplied mainly from Michigan, California, Colorado, Idaho, and New York. Other American crops of appreciable importance include seeds for planting, hemp, hops, dried peas, sorghum (for sirup), and nuts.

SECTION 9. ANIMAL PRODUCTS

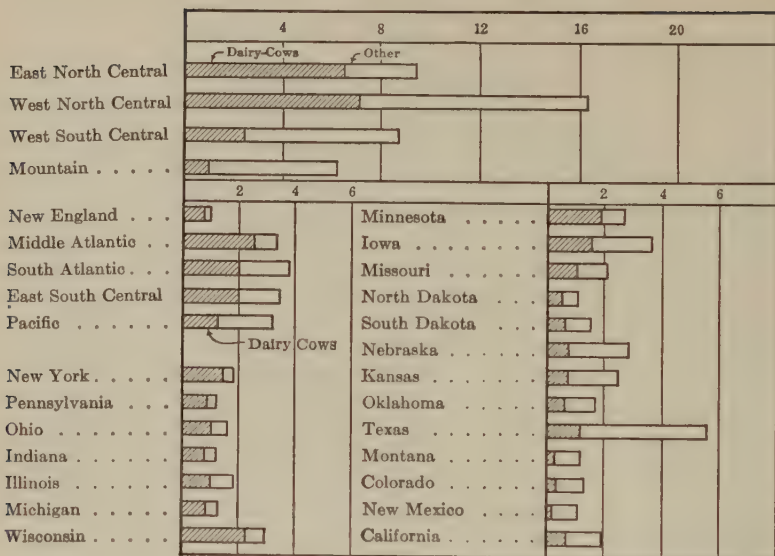
There is, of course, a close connection between the dairy industry and the production of beef. A dairy cow is not always distinguished from the cow intended chiefly for the breeding of meat cattle. However, in the practices of farmers regarding cattle, a marked difference appears between the section devoted primarily to dairying and the section where beef production is the main purpose. In the former most of the male calves are killed young for veal, and cows are ordinarily slaughtered only when their usefulness for giving milk has largely ceased; in the latter, under the present prevailing practice, most of the animals of both sexes are kept till they reach approximate maturity and (save for selected breeding cows) no longer. In Fig. 57 the cattle reported as dairy cows or dairy heifers are distinguished, but there are in addition some millions of female calves intended later for dairy purposes.

The Meat Industry

In the meat production of the United States swine count for considerably more, as to both quantity and value, than cattle and sheep combined. This is partly due to the large export of pork products, but even in domestic consumption these products somewhat surpass beef and mutton. For the farmer it is often advantageous to raise hogs and cattle at the same time. With the growth of population in the United States the number of sheep has steadily diminished.

Statistics are scarcely adequate for comparison of meat production or consumption in the United States with that of other countries. The number of animals on farms is generally reported, but these differ greatly in size and quality, as well as in the efficiency with which they are turned into meat; moreover, necessary distinctions as to the age and sex of animals and the uses to which they are put are often lacking. Beyond question the United States both produces and consumes, in absolute amount, much more meat

CATTLE: NUMBER ON FARMS, IN MILLIONS



SWINE: NUMBER ON FARMS, IN MILLIONS

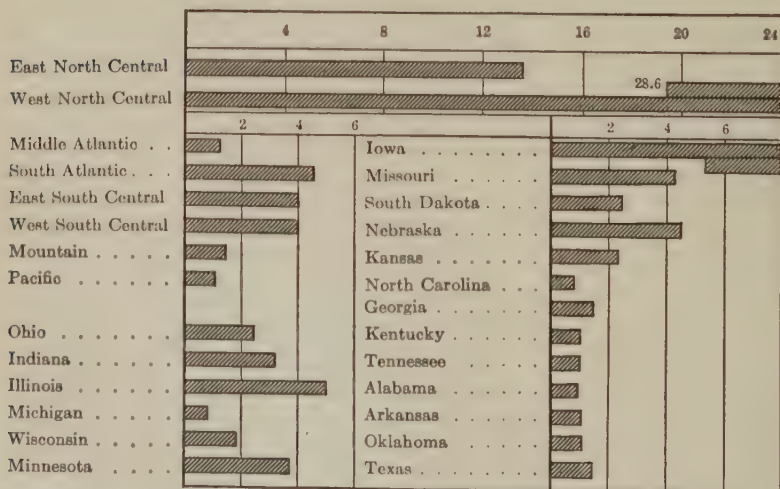


FIG. 57. Diagram showing the number of cattle and swine on farms by principal geographic divisions and states, 1928

than any other country, the per capita consumption being far higher than that in the few countries of greater population. In proportion to the number of inhabitants the meat industry also stands higher in this country than in most; natural exceptions are Australia, New Zealand, and Argentina, with their great grazing areas and sparse settlement. England consumes relatively more meat than any other European country, the quantity being estimated at about 125 pounds per capita annually as compared with about 155 pounds (including lard) in the United States. In Germany the quantity falls below 110 pounds and in France below 95.

Beef Cattle

The business of raising cattle for beef is distributed geographically very differently from the dairy industry. Although, even apart from calves, some cattle from every farming community are slaughtered for meat, yet the bulk of the beef output originates either in the Corn Belt or on the ranges of the Far West (see Fig. 57). The two North Central divisions, together with the West South Central and Mountain sections, possess four fifths of the non-dairy cattle, the West North Central being far in the lead. Texas, with its vast area suited for the grazing of live stock, has many more than any other state; Iowa and Nebraska, with their splendid cornfields, follow.

Many of the range cattle are sent direct to market in spite of the somewhat inferior quality of "grass" beef. Large numbers are shipped for fattening to the farms of the Corn Belt, where a few months add greatly both to their weight and to the value per pound. Most of the cattle of the corn region are "natives," however. Much attention has been given to improving breeds both on the ranges and in the central states. Some farmers confine their activity largely to cattle-feeding, buying not only the animals themselves but also the corn and other feed; larger numbers raise the animals and also the crops for feeding them.

Swine

The "great American hog," whom even the appellation "quintessence of the corn" scarcely makes romantic, is a factor of major importance in the agricultural economy. Almost every farm throughout the country raises one or more hogs; indeed, each agricultural community generally produces a large share of the purely local consumption if not the whole of it. But the industrial centers and the export trade are supplied almost entirely from the Corn Belt. Iowa has twice as many hogs as has any other state. The two North Central divisions together account for seven tenths of the national total. The hog counts for almost nothing on the ranges of the West: he cannot thrive on grass alone. (See Fig. 57.)

The typical hog of the Corn Belt is highly fattened. Fats are an essential in the human diet, and well-fatted pork and lard are among the cheapest and most palatable forms. There is a strong demand for American lard in foreign markets, and during the last few years much the greater part of the exports of pork products have been in this form. Corn-feeding adds fat rapidly, and most hogs are marketed by the time they are a year old.

Sheep

Sheep, like cattle, serve two quite different purposes. These two purposes, however, go hand in hand: the production of wool and that of mutton do not involve distinct practices, as do dairy farming and the raising of beef; and there is no geographical separation of the two branches. The United States, the greatest consumer of wool, imports considerably more than it produces at home, most of the imports coming (directly or through England) from sparsely settled countries like Argentina and Australia, though much also comes from China. It does not, like England, import mutton also, being content with a relatively small propor-

tion of that meat. In the United States the great majority of farmers raise no sheep; to be profitable, a considerable flock must be kept. About two thirds of the total number graze on the ranges of the thinly populated Far West, and most of the remainder are found in the two North Central divisions.

The Packing Business

The packing of meat, like the milling of flour, is relatively inexpensive, adding only moderately to the value of the live animals. Even though the statistics of packing cover only wholesale plants, the gross value of their output exceeds the output of any other factory industry except that of automobiles, but the cost of the live animals and other materials is over five sixths of the total value.

Many hogs for home use are killed on the farms, especially in the South, and on the Western ranges cattle and sheep are similarly slaughtered. In or near most small towns throughout the country there are minor plants furnishing part or all of the meat required for local consumption from animals raised close by. However, the greater efficiency of large-scale operation, both in reducing costs and in saving by-products, has caused the concentration of the business of preparing meat for general markets. The biggest packing plants are situated in the larger cities of the Middle West, not far distant from the main cattle-raising and hog-raising areas. Chicago, St. Louis, Kansas City, Omaha, Sioux City, St. Paul, and Fort Worth are leading centers. This concentration is made possible by the high development of special transportation facilities for fresh meats, without which it would still be necessary to slaughter all animals close to the place of consumption. Indeed, the geographical distribution of the business of raising cattle and hogs itself would probably be very different in the absence of the means of transporting meats, since long-distance carriage of live animals presents no little difficulty. Every day fast trains of refrigerator cars bring millions of pounds of meat

from the Middle West to the great industrial centers of the East. So marked, indeed, are the advantages of the larger packing plants that even localities which themselves ship out cattle and hogs often bring back fresh and cured meats from cities scores or even hundreds of miles distant.

The United States has long been a large exporter of pork and lard. A few decades ago considerable numbers of live cattle were also sent overseas ; with improvement in refrigeration, shipments of fresh beef took their place. Gradually, however, the filling up of the country with people, and the increasing supplies from Argentina, Australia, and New Zealand, caused exports of fresh meat to dwindle till, save for the sudden spurt upward under pressure of war demands, they practically ceased. American sales abroad are now confined mainly to cured pork (bacon, hams, etc.) and lard, which go chiefly to northwestern Europe. The quantities of meat exported have shown a decided tendency to decline during the last few years, but lard exports are still greater than before the war.

The by-products of the modern meat-packing industry are numbered by scores if not by hundreds. They range from violin strings to players' dice, from gelatin to glue, from fertilizers to soaps. The minor by-products alone, which are largely wasted in the small butcher shop, go a long way toward covering the operating expenses of the big plants.

Dairy Products

The dairy industry falls into two main branches : the one devoted chiefly to producing milk for consumption as such, the other producing mainly butter and cheese. The former is necessarily conducted within reasonable proximity to markets, although the modern efficiency of railway and motor service makes it possible to take milk from the farm in western New York and deliver it fresh in New York City the next day. Butter and cheese can be readily transported with refrigeration, and dairy farming with these for its aim

can seek out the areas where natural conditions are favorable. The milk business as such is heavily concentrated in the densely peopled New England and Middle Atlantic regions, and is largely developed also in such increasingly industrial states as Ohio, Michigan, Indiana, and Illinois. On the other hand, the production of butter and cheese for central markets, although of considerable importance in these sections, is more highly developed in Wisconsin and Minnesota, where succulent pasture abounds and where population is less dense. Wisconsin has more dairy cows than any other state of the Union. Minnesota follows, and New York and Iowa are nearly tied for third place.

The Department of Agriculture estimates that about 47 per cent of all the milk produced is used as such in the household, that about the same amount is transformed into more advanced products, and that the remainder is fed to calves or wasted. Butter accounts for about 36 per cent of the milk, while cheese, condensed milk, and ice cream each claim between 3 and 4 per cent.

The daily supply of fresh milk to the large American cities is one of the most difficult tasks of distribution — the more so because the consumption is relatively much greater than in most foreign cities. It involves an elaborate system of collection from thousands of scattered farms, fast and specialized transportation, and highly organized methods of local delivery to the door of the consumer or to the retail grocery. Public-health authorities must needs keep a close eye on the business to assure the purity and safety of the milk.

The manufacture of butter and cheese, unlike the packing of meats, is thoroughly decentralized. Formerly the work was done chiefly on the farms themselves. Many a farmer's wife still works the laborious churn; but at present farm butter is only about three tenths of the total produced in the country as a whole, and in the North Central region the proportion has fallen to less than one sixth. The creamery has taken over the job, doing it far more easily and turning out a much superior product. There are six or seven thou-

sand creameries in the country. One of the chief reasons why most of them are localized affairs drawing milk from a narrow radius is that the by-products — skimmed milk, buttermilk, whey — are best used for feeding calves and pigs on the farms themselves. A large proportion of the creameries are coöperative organizations of the farmers who furnish the milk. The canning of condensed milk has recently become an industry of considerable importance. The product serves a most useful purpose when or where fresh milk is not available ; during the World War great quantities were used by the American army and other armies. The canneries, unlike the creameries, are fairly good-sized plants, but they are distributed throughout leading dairy regions.

Exports and imports of dairy products are alike small. The United States sells considerable quantities of condensed milk abroad, and buys from Europe a good deal of such types of cheese as appeal to the jaded palate, or to the reminiscent taste of certain foreign elements in the population.

It is impossible to set forth with any close approach to accuracy the growth of the dairy industry in the United States. Quite possibly the per capita consumption of milk and its products is no greater today than it was when the bulk of the population lived on farms which directly supplied their needs. But it is a significant achievement of American agriculture and transportation that they have been able to supply dairy products with substantially the same liberality to the multiplying millions of city dwellers. The importance of the cow as a source of cash income to the farmer has unquestionably increased greatly.

Poultry and Eggs

The hen is a humble fowl ; but four hundred million hens cease to be insignificant, and the (approximately) twenty-five billion eggs they produce annually are a major factor in the country's food supply. The value of poultry raised and eggs produced greatly exceeds that of the wheat crop.

Almost every farm raises chickens, and not a few, mindful of holiday tables, raise turkeys or geese or ducks as well. Poultry-raising is distributed throughout the country in rough parallel with the total crop acreage,—a statement that does not hold true of any other class of animals or of any single crop. There is a certain tendency toward concentration in the more densely populated states. Both eggs and poultry, however, can be transported long distances by modern methods with no great deterioration, so that the large cities draw supplies from near and far. Foreign trade in poultry and eggs is not important, and, curiously enough, its most conspicuous feature is the import of dried eggs and egg albumen from overpopulated China.

SECTION 10. THE PROGRESS OF AGRICULTURE

The salient points in the progress of American agriculture have already been touched upon in other chapters and in preceding sections of this chapter. It will, however, be convenient to recapitulate here and to add a few more specific details.

The history of the American farm has been very different from that of the mine or the factory. The farmer can point to no vast piling up of output, to only rare and somewhat minor instances of manyfold increase in a generation. The reason lies neither in the niggardliness of the agricultural resources nor in lack of capacity and enterprise on the part of the tiller of the soil: it is found simply in the nature of the demand for farm products. The major things which we draw from the land are common foodstuffs and common textile materials. These are in the highest degree essential to human welfare, but enough of them is enough. There is no very great difference between the rich man's consumption of food and the poor man's, between that of the advanced nation and that of the backward nation. Even the difference in quality is to a considerable extent due to methods of preparing food products after they leave the farm. These statements hold true of clothing in much the same measure.

Broadly speaking, world demand for the more common products of the soil can grow little faster than world population, and even for those that appeal to less compelling human desires the demand is much less elastic than for most commodities given us by the mine or the factory. Only within comparatively narrow limits can the farm add to the value of its output by raising things that partake of the nature of luxuries. On the other hand, the number of kinds of manufactured goods, already being made or potential in the future, is to all intents and purposes without bound. If a country grows rich enough so that all its citizens have all they want of this or that factory-made article, there are plenty of other articles for which the want is far from satiated. Factories can proceed indefinitely from necessities to comforts, from comforts to luxuries, from luxuries to superluxuries. Agriculture sees no such vast horizon.

Nor can any one country, however rich its land resources or however superior its methods of cultivation, build up its output of farm products indefinitely by resort to export. There are in the world many other regions of high capacity for agricultural production. If farmers elsewhere possess poorer soil or are less efficient, they may be unable to compete in the markets of the few primarily industrial countries; but they are too poor to think of supplying themselves by purchase from more prosperous agricultural nations: they must feed and clothe themselves from their own soil and by their own efforts as best they may.

The American farm has at all times kept fully abreast of the domestic demand of a growing population of steadily rising buying power. It has added to the variety and the quality of its products, supplying a finer and finer diet. Furthermore, it has for many decades maintained a large export. To have increased its output still more would not have served to make the nation richer and would have made the farmer poorer. The eloquent slogans that have lately become the fashion—slogans inviting the people, for reasons of health or enjoyment, to eat more of this or that—

have had some persuasive effect, but they could not work any substantial change in the food habits of a people already well fed. Moreover, these campaigns are more often in behalf of some variant form of the product — perhaps one factory-made — rather than of an original product of the soil.

The really significant achievement of agriculture in the United States, as has been pointed out, has been in cutting down the amount of human labor in producing the things required, thus setting workers free to engage in other activities which spell higher standards of living. The progress of the farm has been measured by the decline in the proportion of the population working on it. For a number of decades preceding 1900, agricultural production grew somewhat faster than the population. Export trade was being built up, and the rapidly multiplying city dwellers, many of them recent immigrants from poorer countries, were raising their standards of living in respect to food. Since the turn of the century there has been less room for expansion in either of these directions, and the increase in farm products has been little if at all greater than that in the number of inhabitants. We have seen that output per worker has risen fully as fast on the farms as in the factories. That this has not meant a parallel expansion in output per capita of the entire population results from the nature of human wants.

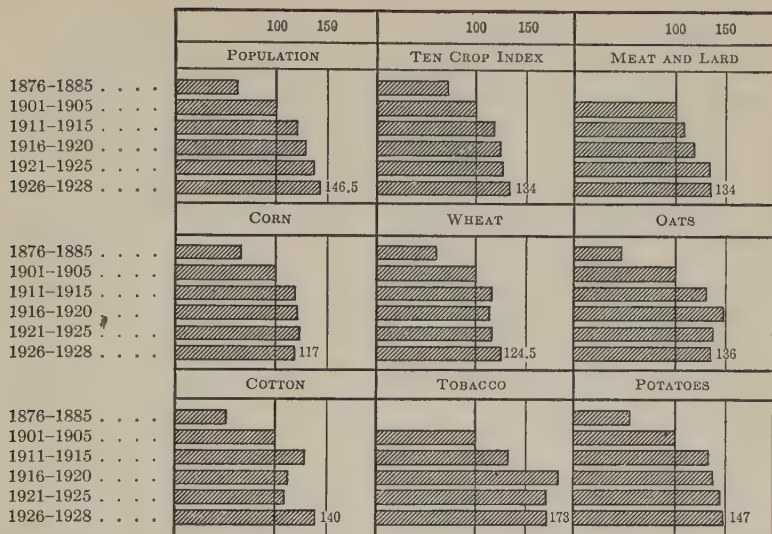
Fig. 58 shows the changes in the production of a number of major agricultural commodities over half a century. For the estimated growth since 1900 in the aggregate output of all farm products (necessarily based partly on estimate) Chapter II, Section 5, should be consulted. It should be noted that the ten-crop index shown in the diagram (sometimes designated as the index of "mass of crop production") does not fully measure the growth of output even of vegetable products of the farm. It covers only staples — wheat, corn, oats, barley, rye, buckwheat, potatoes, hay, cotton, and tobacco. These are, to be sure, the dominant crops; but many others which have become of very considerable im-

portance have shown much more marked increase. This is true, for example, of fruits, nuts, fresh vegetables, sweet potatoes, rice, and the grain sorghums, all of which, except the last named, are direct human foods. The ten-crop index has risen much more in the last half-century than the number of farm workers, but it has not kept pace with the population of the country. The explanation is threefold. Other foods have been substituted for the staples in human consumption; a notable case is the reduced per capita consumption of bread. Owing to the motor car and the tractor the number of horses and mules in the country is considerably less today than three decades ago, and these animals represent a very great factor in consumption. Finally, all farm animals, including those raised for food, are fed more efficiently than formerly, so that relatively less crop output is needed for this purpose. The stationary position of the production of corn, oats, and hay for some time past is due to the two causes last mentioned. These three crops count immensely in the general index. The potato is the only food crop shown in Fig. 58 which has kept pace with the population in output.¹

Down to the outbreak of the World War the cotton crop expanded rapidly, much more than the number of inhabitants of the United States. Both domestic and world demand was rising steadily by reason of advancing standards of living and of the substitution of cotton for flax and wool. The war cut down the buying power of foreign countries for this staple, the greater fraction of which has always been exported, and only recently has their demand been restored. Notwithstanding reduced world consumption there were a few years during the war and immediately after its close when the ravages of the boll weevil caused a scarcity so marked that prices of cotton rose even more than those of the rank and file of commodities. The result, however, was an increase in plantings so marked (especially in Texas and Oklahoma) that, even with rather low yields per acre, pro-

¹ The sweet potato is not covered by the diagram.

A. RELATIVE NUMBERS (1901-1905 AVERAGE AS 100)



B. COMPARISON OF PRODUCTION AND EXPORT

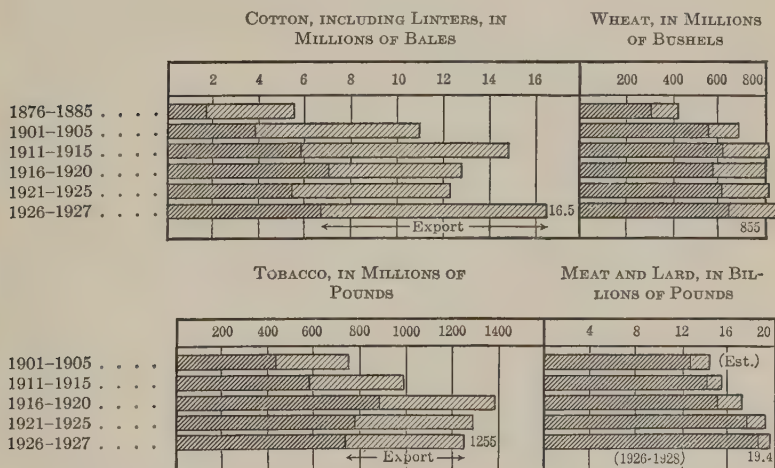


FIG. 58. Diagram showing the increase in production and export of major crops

Section A presents relative numbers comparing average annual production for various periods. Section B shows absolute figures of production and export (annual averages). In the case of tobacco the proportion exported is not adequately shown, since the tobacco as shipped has shrunk considerably from the green weight

duction has of late materially surpassed that of prewar years. The huge crop of 1926 caused a sharp break in prices, and since then the acreage in cotton has been a little smaller.

Statistics of tobacco, which do not go back so far as some of the others, show a very marked increase in output during the first two decades of this century, reflecting greater demand both at home and overseas. Since that time the quantity produced has fallen off somewhat, but the quality has risen decidedly. The cause of this phenomenon is the shift, both in America and elsewhere, from chewing and pipe tobacco to the cigarette. If the changes in the output of the several grades of tobacco could be computed separately and then combined into an index weighted according to their value, this index would doubtless show an advance during recent years.

It is impossible to measure with any close approach to accuracy the long-time growth of the live-stock industry and of its products. Early statistics of the number of animals on farms are not always comparable with those of recent date, either because of inaccuracy or because of differences in the time of the year to which they relate. In any case the data could not reflect properly the changes in the production of meat, milk, eggs, and other similar commodities, since by improvement in breeds and in methods farmers are able to obtain a larger annual output of these from a given animal population. Among other things they have learned that it pays to market meat animals rather young, since older stock add less weight for a given ration. There is also a lack of satisfactory long-time statistics of the number and weight of the animals slaughtered and the quantity of other animal products turned out by the farms. Even during recent years there are almost no data for the number of animals killed on farms or in small plants catering only to the local market. The growth of large packing establishments, for which accurate statistics do exist, has been partly at the expense of such small-scale production of meat. A good many farmers have no precise knowledge of the amounts of

milk or eggs they produce, and the situation was formerly much worse in this respect. The reports to the census enumerators have often been very rough approximations.

It is probable that the output of animal products in the United States has increased somewhat more than has that of crops during the last half-century, and approximately as much as the population has grown. Possibly the per capita consumption of meat has declined slightly, not because the people can less well afford it but because of their preference for other foods. The incomplete annual statistics available since 1907 indicate such a decline. There is reason to believe that the consumption of milk and butter has risen somewhat, and that of eggs as well. The export of animals and their products — chiefly meat and lard, — has never been a great proportion of the American output, and changes in foreign sales have had relatively little bearing on the course of the animal industry.

The most noteworthy achievement of the country in this field — an achievement in which the farmer, the packer, the railway, and the distributor have alike participated — has been in the conquest of distance and time in the handling of animal products. They have been able to supply the rapidly increasing hosts of city dwellers with these highly perishable products in wholesome condition and in quantities comparable with those consumed at a time when most of the people lived on the farms themselves.

CHAPTER IX

MINING AND QUARRYING AND RELATED MANUFACTURING INDUSTRIES

SECTION 1. GENERAL ASPECTS

Mining (including quarrying) in the United States, as in most countries, employs a much smaller number of workers and turns out a much smaller value of product than agriculture or manufactures. The reason lies in the fact that the miner is merely appropriating what nature has created over long millions of years. Because she has been liberal her gifts are for the most part cheap. The utility of mine products in modern life is enormous; were they harder to get, the world would devote much more effort to extracting them and their value would be correspondingly greater.

From the standpoint of use most mineral products fall into four main groups: (1) fuels, (2) enduring materials for construction and equipment, (3) precious metals and stones, used for ornament and as money, and (4) those for chemical purposes. These uses, especially the three first named, are wholly different from those to which we put agricultural products, which serve chiefly to feed and clothe us; the mine and the farm complement one another. The forest furnishes fuel and materials for construction, but its capacity is much more limited both as to the quantity of output and as to the adaptability of the product to multiform purposes.

Although the total number of minerals used by man is great, only a score or so rank as of first-class importance. On the other hand, the methods of production are so varied and the geographic location of mines so scattered that mining does not lend itself as readily to generalization as do agriculture and manufactures. For example, there is little

significance in an average value of output per worker in mining considered as a whole, since production per man is several times greater in value in some mining industries than in others. Some minerals are abundant and others are scarce, so that the value of the material as it lies in the ground varies widely. Again, some mining enterprises require much and costly machinery, others but little. The share contributed by human labor to the value of output is therefore far from uniform.

The extraction of many minerals from the earth is so intimately tied up with further processes to make them marketable that no hard-and-fast statistical line can be drawn between mining and manufacturing. Ores must be smelted; a ton of the crude material may yield but a few pounds of metal, perhaps only a few ounces. The process may of necessity have to take place almost at the mouth of the mine and by the same concern which digs out the ore. Brickmaking is an even more striking illustration of the overlapping of the two great branches of industry; ordinarily the digging of clay and its shaping and burning in the kiln go hand in hand. Coal and some other minerals require no manufacture, and the statistics for petroleum always clearly distinguish production of crude oil from refining.

In its decennial report on mines and quarries the Census Bureau makes a special effort to exclude manufacturing operations from the returns. The Bureau of Mines, on the other hand, uses a double method. In certain reports the value of metals is given after they have been smelted. A second set of values, distributed by states, excludes the addition thus created by manufacturing processes. For 1927 the larger total for the value of minerals amounted to \$5,520,000,000 and the other to \$4,888,000,000. The larger values are used in Fig. 59, the smaller in Fig. 60. State statistics must obviously deal with crude metals, since ore originating in one state is often smelted in another. Even the smaller total includes the value added by manufacture in the case of brick, cement, and certain other products.

The number of persons engaged in mining and quarrying (proper) as reported by the Census of 1919 was about 1,080,000. It is, roughly, the same at the present time, the increase in output (see Fig. 8, page 65) being attained by the use of more capital and by better equipment and methods. The principal items of expenditure and the value of products for 1919 were given as follows :

Salaries and wages	\$1,456,000,000
Supplies and materials	529,000,000
Royalties and rents	176,000,000
Other reported expenses (not covering some minor items)	
and taxes	383,000,000
Total reported expenses	\$2,544,000,000
Value of products	3,158,000,000

These figures are not complete enough to enable one to judge the profit of the mining enterprises. Wider differences in rate of return to capital appear in mining than in most other fields of economic activity. Mining has the lure of the gaming table. It is the common opinion — an opinion not without some foundation — that in the more speculative mining industries, such as that of petroleum or of gold, the losses of the rash and unfortunate outweigh the gains of those who "strike it rich." Losses are sometimes swelled by "blue sky" promotions deliberately aimed to fleece the gullible. Fortunately there has been in recent years a growing tendency for large and responsible concerns to undertake not only the exploitation of proved territory but also the prospecting and "wildcatting" for new supplies. By systematic methods and by liberal resort to geological science such concerns can reduce risks greatly; moreover, their large size enables them to work on the principle of averages, offsetting failures here by successes there. In the case of some of the important minerals, such as coal, iron ore, building stone, and clay, deposits capable of meeting needs for a long time are already well known. Mining for these involves no greater speculative risks than confront the farmer, the manufacturer, or the merchant.

Mining in the United States and in the world generally has increased at a far faster pace than agriculture and even somewhat more rapidly than the manufacturing industries. Supplying, as it does, fuel and equipment-material for factories and for railways, the industry naturally grows along with them. The rapid progress of mining evidences the ever greater elaboration of goods and services. The average annual value of American mineral products from 1881 to 1885 was about \$425,000,000.¹ In the last few years it has been about \$5,750,000,000, or nearly fourteen times as much. The gain is only in relatively small part due to a rise in prices. In the meantime population has not much more than doubled. Since the beginning of the present century the output of the principal minerals, in terms of quantity and with changes in price eliminated, has multiplied not far from four times (see Chapter II, Section 5). The industry has advanced greatly in efficiency, the output per person employed increasing during this period about 60 per cent.² The growth in production has been shared by practically every mineral product except gold. The most rapid advance, however, has been in petroleum. Partly because of the greater economy in the burning of coal and partly because of the growing use of petroleum and of water power, the increase in output of coal has been slower than that of most other minerals, although it is still very considerable.

SECTION 2. RANKING OF INDUSTRIES AND PRODUCTS

A ton of gold is worth at least two hundred thousand times as much as a ton of coal, but the world's output of coal is worth many times more than its output of gold. The importance of the various minerals in the economy of the world is

¹ These represent the larger totals of the Bureau of Mines series.

² This is a combined average in which each industry is weighted by the number of wage-earners. If weighted by value of output the percentage is much higher (see page 66).

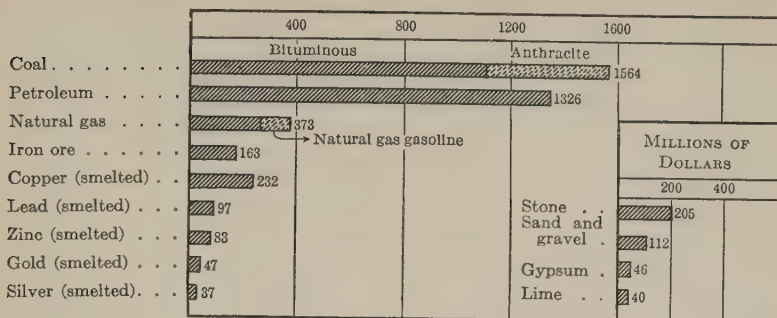
more or less in inverse proportion to their unit value. Fortunately the minerals most essential are also the most common.

The mineral fuels perish with their use; the metals, stones, and clays are long-enduring. Hence it is that annual output of the former is greater in tonnage and in value than that of the latter. From the standpoint of value coal is the leading mineral product of the United States, as it is of the world as a whole. Petroleum, much less in tonnage but higher in unit value, ranks second. Eliminating the value added to ores by smelting and that added to certain other minerals by processes of manufacture, coal accounts for about 30 per cent of the total value of mining and quarry products and petroleum for about 26 per cent. Moreover, a third mineral fuel, natural gas, with its derivative natural-gas gasoline, has during recent years ranked far ahead of any of the metals or mineral construction materials in value. The three mineral fuels together represent an annual value — at the mine or the well — of more than three billion dollars, a striking indication of the importance of heat and power in the economic life of the United States.

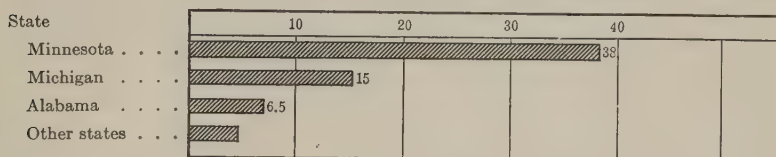
In Fig. 59 the data shown for iron ore are not comparable with those for the other metals, because the latter represent not the ore but the smelted metal extracted from the crude material at no little cost. However, the output of copper ore is worth at least as much as that of iron ore. Iron is the most essential metal, but it is also the most abundant and the most easily mined. Among the metals lead, zinc, gold, and silver, in the order named, follow iron and copper.

Two or more of the nonferrous metals are often associated in the same ore. Usually one of them dominates, and the others are in the nature of by-products. The official statistics distinguish, in addition to ores of a more or less "straight" type, "dry and silicious (gold and silver) ores," lead-zinc ores (often these contain silver also), copper-lead ores, and copper-lead-zinc ores. In classifying mineral industries the Census Bureau has found it necessary to combine gold and silver mining under one head and lead and zinc under another.

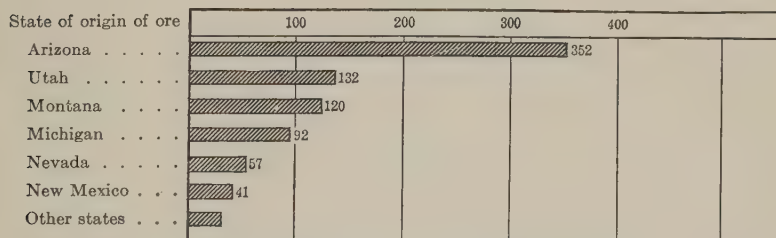
A. VALUE OF PRINCIPAL MINERAL PRODUCTS, IN MILLIONS OF DOLLARS



B. AVERAGE ANNUAL PRODUCTION OF IRON ORE, IN MILLIONS OF LONG TONS



C. AVERAGE ANNUAL PRODUCTION OF SMELTED COPPER, IN THOUSANDS OF SHORT TONS



D. PRODUCTION OF REFINED LEAD, IN THOUSANDS OF SHORT TONS

E. MINE PRODUCTION OF ZINC, IN THOUSANDS OF SHORT TONS

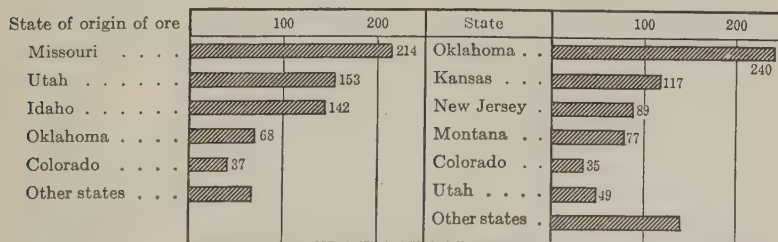


FIG. 59. Diagram showing the average annual value of the principal minerals, together with the production of iron ore, copper, lead, and zinc, 1926 and 1927

Besides the metals listed in Fig. 59 the United States produces large quantities of aluminum; the ore from which this is derived, bauxite, is partly of domestic origin, partly imported. The value of the ore itself represents only a fraction of the value of the extracted metal, the process being a rather expensive one. Other metals of some importance supplied by American mines include antimony, mercury, platinum and allied precious metals, together with certain metals chiefly used for alloying steel: cadmium, manganese, tungsten, uranium, and vanadium. For some of these minor metals the domestic supply is supplemented by imports. The only metal of major rank not found in the United States is tin. The country also depends on imports for nickel, chrome, and cobalt.

Aside from fuels and metals the major minerals are construction materials, usually quarried or dug from the surface of the earth. If we include the value created by elaborative processes immediately tied up with the extractive, brick appears as by far the most important of these materials, but the clay is so easily obtained and so cheap that the greater part of the value of bricks is due to manufacturing processes. The same is true of cement, which has grown immensely in use during recent years. As for stone, sand, and gravel, it is probable that the statistics considerably understate the full output, for these are often quarried or dug out in very simple and unorganized fashion. Most mineral construction materials, save high-grade building and monumental stone and cement, are fairly widespread over the country; consequently their cost is usually modest, and the great quantities of these useful materials make merely a minor item in the national budget.

Other nonmetallic minerals produced in considerable quantity in the United States serve various uses — technical, chemical, and for food and drink. Among these may be mentioned, approximately in the order of their value, gypsum, lime, sulphur, salt, phosphate rock (used for fertilizer), asphalt, mineral waters, fuller's earth, fluorspar, feldspar,

talc and soapstone, and diatomaceous earth and tripoli (used for polishing and for filtering liquids). The country, perhaps fortunately, is scarcely a producer of any of the precious stones, though it probably uses more than all other countries put together.

SECTION 3. GEOGRAPHIC DISTRIBUTION OF MINING INDUSTRIES

The geographic distribution of the mining industry, considered as a whole, has no great economic significance. There is less of kinship within this branch than there is in manufactures, to say nothing of agriculture. The individual minerals are distributed in very different ways. The location of mining industries depends primarily on the whims of geology: mines are where minerals are found. To be sure, in some cases there are alternative sources of supply, and here the location of mines is affected by the relative quality of the deposits, the relative cost of extraction, and the distance from markets,— factors similar to those that determine where crops and domestic animals shall be raised. The geographic divisions which lead in mineral production are the Middle Atlantic, where coal is overwhelmingly the chief item, and the West South Central, in which oil is equally dominant (see Fig. 60). Third comes the East North Central with coal again by far the largest mine product. The South Atlantic, Mountain, and Pacific divisions rank close together. The great inferiority of New England in mineral wealth is conspicuous: it possesses neither the fuels nor the metals. In proportion to their population mining is much more important in the Mountain states than elsewhere; they are a major source if not the principal source of all American metals except iron, and they produce coal and oil as well. The West South Central and Pacific divisions also stand out by the high position of mining in comparison with other industries. Pennsylvania has a long lead over any other state in the value produced by mines. Oklahoma and

MINERAL PRODUCTS, IN MILLIONS OF DOLLARS

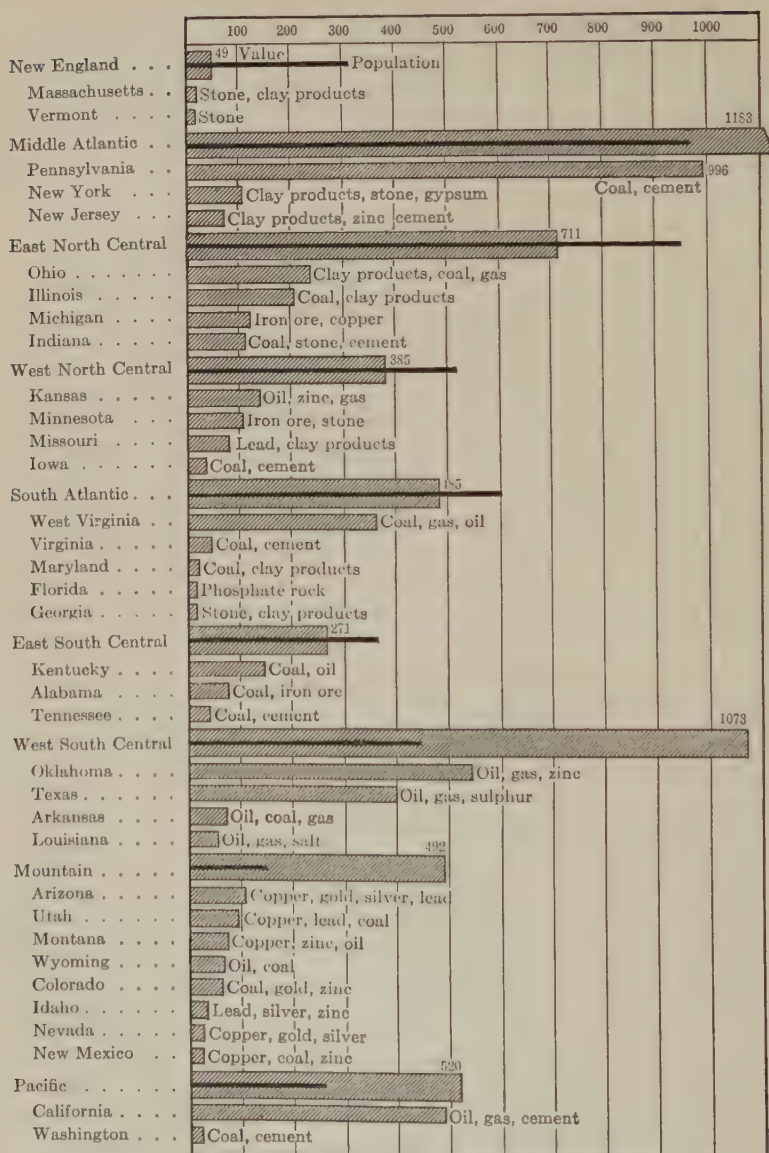


FIG. 60. Annual value of minerals by divisions and states, 1926 and 1927
The broad bars are used merely for emphasis. No scale is shown for population

California, the two largest producers of petroleum in the world, follow, while Texas with its oil and West Virginia with its coal dispute the fourth position, and Ohio and Illinois are close rivals of each other.

Unequal as are the several divisions in total value of mineral output, the inequality is less marked than in agricultural products or factory products. Climate marks out broad geographic belts for agriculture, and date of settlement and concentration of population have much to do with the location of factories. Minerals of one sort or another are scattered pretty widely. On the other hand, most of the individual branches of mining are more narrowly concentrated than is the production of most farm products or that of a good many manufactured commodities. Often a few states account for nearly the entire output of a given mineral.

Coal is the most widely distributed of the major minerals, a considerable quantity being mined in a score or more states, though six or eight account for the great bulk of it. In the case of petroleum there are seven states of large production and eight or ten more of some importance (see Figs. 61 and 63). None of the metals are widely distributed (see Fig. 59). The Lake Superior district produces five sixths of the iron ore, and Alabama most of the rest. Copper-mining is of importance in only six or eight states; the same is true of lead, zinc, gold, and silver. A number of the minor minerals are even more restricted. Even where a state possesses metallic deposits of a given kind, these are usually confined to a few small areas, sometimes to a single locality.

SECTION 4. COAL

Notwithstanding the inroads on its province during the last three decades, the coal industry is, taking the world as a whole, by far the greatest of those which draw wealth from beneath the earth. The annual value of output in the United States ranges from \$1,500,000,000 to \$1,700,000,000. Only two of the manufacturing industries add as much as

this to the value of the materials they use. In the coal mines are employed (somewhat intermittently, to be sure) between seven hundred thousand and eight hundred thousand men. Even when reduced to the basis of continuous employment, the workers outnumber by more than two to one the total in all other mining industries combined. It is little wonder that the recent plight of this vast industry should have attracted nation-wide attention.

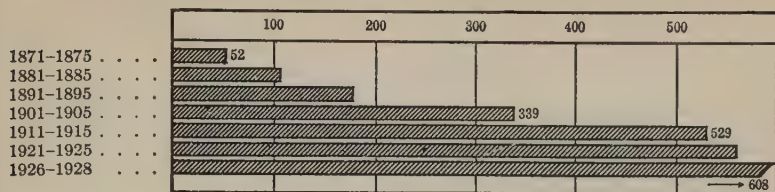
The United States possesses more than half the total known coal deposits of the world. According to the best available estimates there lie beneath its surface something like four thousand billion tons. A little over half of this is classed as of bituminous grade, and most of the rest as lignite, the quantity of anthracite being less than 1 per cent. At the present time each year uses up somewhat less than a billion tons, the figure being estimated at roughly nine hundred millions, including the waste, unavoidable or avoidable, connected with the mining of the coal actually used.

Fig. 61 shows the long-time growth of the coal industry. The rate of increase greatly outstripped that of the population down to about the outbreak of the World War, but has since not equaled the expansion of the population — a fact due to increased competition of other sources of power and to greater economy in methods of using the coal itself.

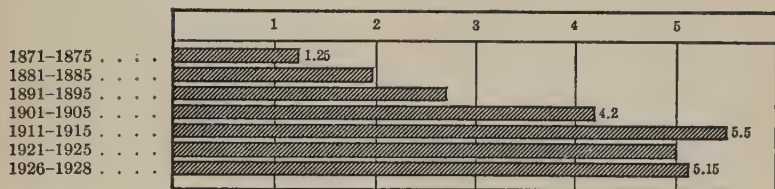
Regions and States

The distribution of coal reserves geographically is very different from that of the current production. In the Western states lie deposits much greater than in the East, but these are as yet barely scratched. This is partly because much of the Western coal is inferior in quality. Lignite predominates in many areas, and this has a heat value ranging from one half to barely one third that of the high grades of bituminous coal. In some regions of the West, too, the coal deposits are very deeply buried. There is, however, much good and accessible coal, and the fact that even this has so far been

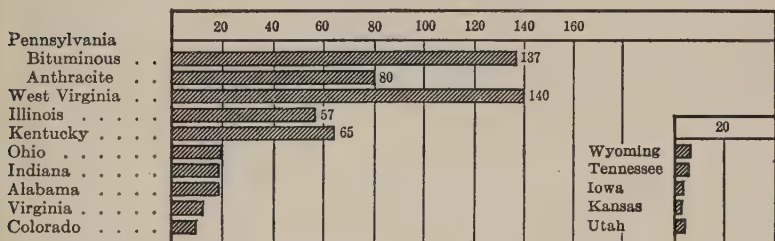
A. AVERAGE ANNUAL PRODUCTION, IN MILLIONS OF SHORT TONS



B. AVERAGE ANNUAL PRODUCTION PER CAPITA, IN TONS



C. AVERAGE ANNUAL PRODUCTION BY STATES, 1926-1928, IN MILLIONS OF TONS



1900

Percentage of
Total
Coal Production



1926-1928

FIG. 61. Diagram showing coal production in the United States

little used is due to the limited local requirements and to the competition of oil, gas, and water power.

The geologists distinguish six major coal-bearing provinces. The Eastern, or Appalachian, province produces about three fourths of the present national output (production by states is shown in Fig. 61, C). It covers large areas in Pennsylvania, West Virginia, and Ohio, with parts of Maryland, Kentucky, Tennessee, Virginia, and Alabama, and is estimated to contain reserves of some 500,000,000,000 tons, the quantity thus far mined being about 2 or 3 per cent of the original total. Practically all this coal, so conveniently situated for the great centers of industry, is of very good quality. The splendid anthracite, however, is confined to a small area in northeastern Pennsylvania; the original deposits are estimated at 19,000,000,000 tons, of which about 4,000,000,000 have already been taken out. Scattered through the Appalachian field are large blocks of coal well adapted for conversion into blast-furnace coke, a highly valuable characteristic in view of the enormous demands of the iron industry.

The Interior coal province, although exceeding in area the Appalachian, has less thickness of deposits and a smaller aggregate content. Its eastern section covers a large part of Illinois and smaller areas in Indiana and Kentucky. Its western prong extends from southern Iowa to northern Texas, with the greatest area in Missouri. Most of the coal is scarcely so good as the Appalachian, and little is suited for coking. The great bulk of the production is in Illinois and Indiana; the coal there is of better quality, as well as nearer to the centers of consumption. The stationary or declining position of the industry in the western part of the province, however, as in certain Mountain states, is due to the competition of petroleum.

The output of the Interior coal province is about one fifth of the national total. This leaves only about one twentieth for all the other four regions combined. The Gulf district has relatively small reserves, exclusively lignite; mining is car-

ried on only in Texas. The Northern Great Plains province, chiefly in North Dakota, Wyoming, and Montana, has vast reserves of lignite and is estimated to contain also some 40,000,000,000 tons of bituminous coal. The Rocky Mountain region comprises somewhat scattered but immense deposits, with bituminous predominating. Finally there is the smaller Pacific field, mainly in western Washington.

The coal industry in its earlier decades spread out toward the west. More recently it has ceased its westward migration and turned toward the south. Against stationary or declining production in most other states, those lying just to the south of the Ohio and the Potomac have shown rapid growth. Pennsylvania has suffered especially from this Southern competition, but, apart from furnishing nearly all the anthracite, it retained until 1927 the leading position in bituminous output. At the beginning of the century the Keystone State produced over half the national total of coal (bituminous and anthracite together); now it produces not much more than one third. Meanwhile West Virginia has multiplied its output six or eight times, and now produces about one fourth of the aggregate for the country, having taken over the first place in bituminous output. Similarly, Ohio has produced much less in recent years than before the World War, and Illinois and Indiana also somewhat less than at that period, whereas eastern Kentucky has gained with great rapidity, and Virginia and Alabama very materially.

This geographic shift has been tied up with labor controversies. The unionized Northern mines have produced at higher cost than the prevailingly non-union mines south of the Potomac and the Ohio. Other factors are of importance, however. New deposits of high quality have been opened up from time to time in the southern Appalachian region. Railroads have made such rates as enable its coal to move cheaply into interior territory nearer to the mines of the Northern states, the roads leading to the seaboard have developed a high degree of efficiency, and water transport to North Atlantic points is cheap.

Problems of the Coal Industry

The bituminous industry has for decades been in a situation very different from that of the anthracite industry. The latter is chiefly in the hands of a few great concerns. Since the demand is very largely for household fuel, it is more or less independent of fluctuations in general business conditions, and the seasonal variations are increasingly smoothed out through storage. Knowing that their reserves are limited, the anthracite operators are under little temptation to shove excessive quantities on the market. Notwithstanding occasional prolonged strikes, employment in the mines has been more continuous in recent years than it was two or three decades ago.

On the other hand, the capacity of the bituminous branch is overdeveloped, and employment is excessively irregular. This has been true in some measure for many years past; even before the war the average mine seldom worked more than two hundred and twenty-five days in a year and often fewer than two hundred days. Under the technical conditions then prevailing, as now, it was virtually necessary to maintain a capacity materially in excess of normal needs. The demand for bituminous coal is subject to sharp cyclical and seasonal variations. Storage is not a simple remedy: it involves heavy cost of handling and of deterioration. Irregularity of operation was accentuated at times in the past by inadequate and unequal supply of railroad cars. The situation of the industry has become worse since the World War, notwithstanding improvement in methods of mining, increased storing of coal, and adequate supply of cars. The explanation lies in the opening of many new mines under the pressure of abnormal war demands, in the further invasion of other fuels, and in the greater economy in getting heat and power out of the coal itself. In no year since 1918 have the mines operated on the average more than two hundred and twenty days, and in two years the average fell below one hundred and fifty days. It is commonly asserted

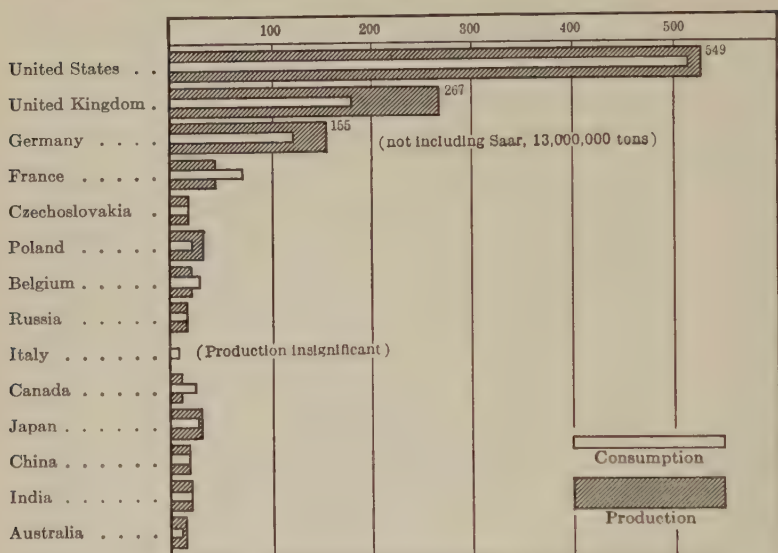
that the capacity of the mines and the number of workers attached to them are at least 50 per cent greater than needed.

The bituminous industry, unlike the anthracite, is one of relatively small-scale operations. This fact results in part from the wide geographic distribution of the deposits and from the nature of the task of mining coal, and in part from the irregularity of demand. It may be that the managers have shown less organizing ability than those in most other lines of business. In any case, over two fifths of the output of bituminous coal is from mines with an annual production of less than two hundred thousand tons each. In the last few years a number of consolidations have been made, but even yet big concerns play no major part in the industry.

That the bituminous operators are not lacking in progressiveness is evidenced by the increase in the average output per man per day. In the anthracite mines the average has changed but little in many years, technical advances having been offset by the necessity of working deeper, thinner, and more contorted seams; in the bituminous branch, on the other hand, the average per man per day rose from 2.6 tons in 1890 to 4.0 tons in 1920 and to over 4.5 tons now. This gain is due in small part, if at all, to the opening of more accessible deposits. One of the major causes has been the fact that the proportion of the coal "undercut" by machines has risen from one twentieth in 1890 and one fourth in 1900 to over seven tenths at the present time. Of recent years mine operators have begun to introduce machines for loading coal on the mine cars, a method said to promise even more in lowering costs than the cutting machines. The capacity of prime movers in the bituminous mines in 1919 (the latest census) was four times greater than in 1902, an expansion much exceeding that in the output of coal. The greater part of the underground machine work and hauling is now performed by electric motors.

There has also been much improvement in mining practice with regard to the conservation of coal. Formerly nearly half the coal was left in pillars to support the roof of

A. PRODUCTION AND CONSUMPTION, IN MILLIONS OF METRIC TONS



B. PRODUCTION AND CONSUMPTION PER CAPITA, IN METRIC TONS

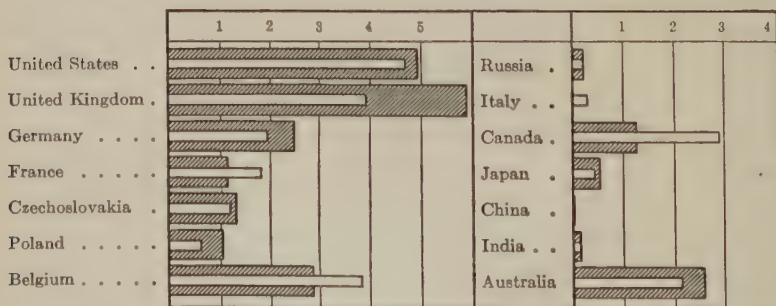


FIG. 62 A. Diagram showing the annual production and consumption of coal in the principal countries of the world

The figures are in metric tons (2205 pounds). In both sections the broad bar represents production and the narrow bar consumption. The data relate to the mean of the years 1923–1925, since conditions in 1926 and 1927 were abnormal owing to the British coal strike. For Germany and France 1923 is omitted from the average as being abnormally low. Lignite is reduced to the equivalent of black coal. Data are from publications of the League of Nations

the seams. The coal left in mining at present is estimated at 34 per cent, of which 19 per cent is considered preventable and the rest unavoidable.

The World's Coal

Europe's coal industry has suffered perhaps even more severely since the war than that of the United States. The causes at work in this country have operated, though perhaps with somewhat less force, on the other side of the Atlantic, but an additional depressing factor there has been reduction in demand as the aftermath of the war. The British coal industry, largely dependent on export for its prosperity, was profoundly disturbed, as is so sharply indicated by the great strike of 1926. Germany lost much mine territory to France and Poland as a result of the war. She has made up the loss in part by greater output of lignite.

The world's total production of coal (reducing lignite to its approximate equivalent in black coal) is now only 5 or 6 per cent more than in 1913. The share of the United States in world output is substantially two fifths, being virtually the same as before the World War. The United Kingdom and Germany have considerably less production than fifteen years ago (adjusting the German lignite to its equivalent in black coal), but several other countries have added to their output. As regards consumption of coal the position of most countries is substantially similar to the position they occupy in total consumption of mineral fuels and water power (see Chapter V, Section 4).



FIG. 62 B. Percentages of total world production of coal, 1923-1925

Uses of Coal; Export Trade; Coke

The coal of the United States is divided among the several major consuming groups not very differently from the combined output of all fuels and water power (see Chapter V, Section 4), except that coal plays no part in moving automobiles. Anthracite is employed very differently from bituminous coal. Owing to its slow and steady burning and its smokelessness, anthracite is peculiarly adapted for use in cities and, above all, for household heating. About three fifths of it goes into household consumption, whereas only about one sixth of the bituminous is so employed.

Although the United States is outranked in the export of coal only by the United Kingdom and Germany, its exports are relatively insignificant compared with domestic consumption, being normally only 3 or 4 per cent of the total output. The great bulk of the export goes to our immediate neighbor to the north, Canada. Occasionally when coal production in Europe is disturbed, considerable quantities are sent to that continent, even "coals to Newcastle." This was true, for instance, during 1926.

The consumption of coal in the form of coke for the smelting of iron is very large, amounting to about 15 per cent of the total production of bituminous coal. A point of much economic interest is the rapid spread of methods of conserving the by-products of coke-making. Formerly almost all coke was made in beehive ovens (so named from their shape), where no effort was made to save either the vast quantity of gas generated or the various liquid and solid residues. Today the great bulk is made in so-called by-product ovens which save many millions of dollars' worth of these subsidiary products. Steel-works which formerly bought coke prepared at the mouth of the mine now bring thence the coal itself and use the gases generated in coking for heat and power. From 1901 to 1905 only 8 per cent of the coke made in the United States was from by-product ovens; from 1921 to 1925 the proportion was about 75 per

cent, and in 1928 it was no less than 92 per cent. The beehive ovens are now held chiefly as a reserve to be brought into use only when the demand is abnormally strong.

Although coke is used to some extent for domestic heating and in various other industrial processes, the growth in its production has conformed closely to that of pig iron. The output is now about double what it was at the beginning of the century; it averages more than fifty million tons annually. The quantity of coal consumed for the purpose is about 50 per cent greater than the weight of the coke obtained.

SECTION 5. PETROLEUM AND NATURAL GAS

Crude Oil

Few industries reflect to such a degree as that of petroleum the enterprise, the ingenuity, and the daring of the American prospector, business manager, and technician. The industry stands out by the swiftness of its growth, the highly speculative nature of crude-oil production, the specialized methods of transportation, the quick adjustment of processes to the changing demand for the several products, and the worldwide distribution of the exports. Its expansion has made possible the extraordinary multiplication of automobiles, with all that they mean in American life. The peculiar advantages of petroleum make the price per unit of weight much higher than that of coal, and the aggregate annual value of output consequently falls not very much below that of the solid mineral fuel.

For the last two or three years American production of crude oil has been in the neighborhood of nine hundred million barrels, more than three times as much as just before the World War and about fifteen times as much as in 1900. The United States is the source of seven tenths of the world's supply (see Fig. 63, A). For several years about the turn of the century this country, temporarily halting, was sur-

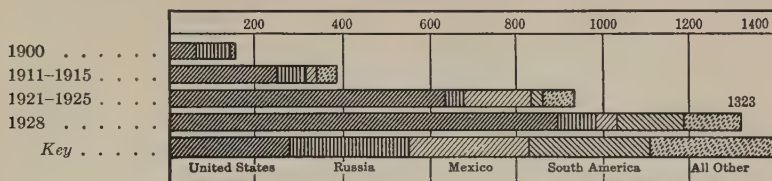
passed by Russia. From that time on the United States output, spreading to new areas, bounded forward and that of the Muscovite empire slowly fell off. Meanwhile Mexico rose rapidly to second place; but in the last few years its production has declined markedly, and Venezuela (a very new field) has leaped into second place, with Russia, again gaining in output, as the third producer. Outside of Russia the petroleum industry of the world is dominated by American, British, and Dutch interests. England is peculiarly concerned with oil because of her great navy and merchant fleet, which increasingly rely on this fuel.

Notwithstanding its own immense production the United States imports great quantities of crude and semi-manufactured oil (also some finished products) from Latin-American countries, in which for the most part refineries are lacking, and in which Americans have been the leaders in developing oil wells (Fig. 63, *C*). This importation enables the refiners to maintain and increase the great export trade in finished products; otherwise practically all their output would be required to meet home demands.

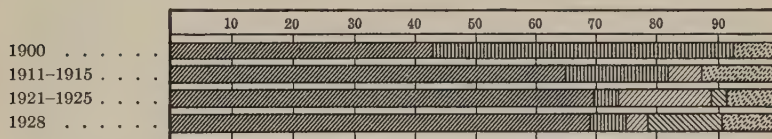
American petroleum production is widely distributed. Seven states — California, Oklahoma, Texas, Arkansas, Kansas, Wyoming, and Louisiana — produce each over twenty million barrels yearly, and eight or ten others have an output of some importance. Seven regions are distinguished (see Fig. 63, *D* and *E*). The Appalachian, in Pennsylvania, Kentucky, and West Virginia, was long the only source. It still keeps up a steady flow of high-grade crude oil, but the output, which is less than in the palmy nineties, is now but a small fraction of the national total. Oil was next found in the Lima-Indiana field (lying partly in Ohio); but the production there, which thirty years ago rivaled that of the Appalachian, has dwindled. Short, too, was the heyday of the Illinois field, discovered about 1905.

Very different has been the history of the great oil fields west of the Mississippi. These are by no means new (they began producing about the turn of the century), but thus

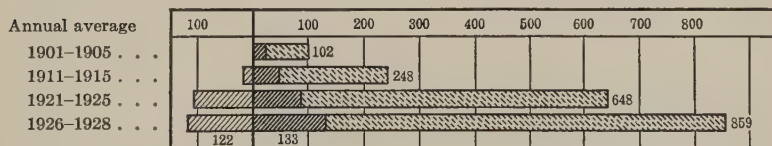
A. ANNUAL WORLD PRODUCTION OF PETROLEUM, IN MILLIONS OF BARRELS



B. PERCENTAGE OF TOTAL WORLD PRODUCTION

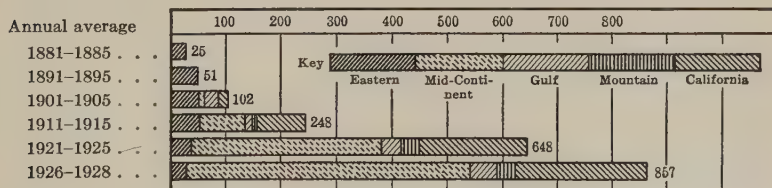


C. UNITED STATES IMPORTS



D. UNITED STATES PRODUCTION, IN MILLIONS OF BARRELS

E. UNITED STATES PRODUCTION BY FIELDS, IN MILLIONS OF BARRELS



F. PERCENTAGE OF UNITED STATES TOTAL PRODUCTION

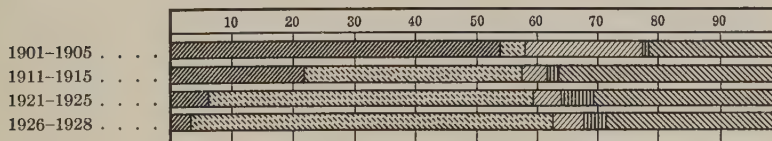


FIG. 63. Diagram showing crude-petroleum statistics

Sections A and B show world production and the absolute and relative shares of the United States and other principal producing countries. The most important countries grouped under "All other" are Persia, Netherland East Indies, Rumania, and Poland. In section C the bars represent United States imports, chiefly of crude oil. In section D the full length of the bars represents United States production of crude oil, and the shaded section United States exports, whether of crude or refined oil.

Sections E and F are self-explanatory

far the output has rapidly expanded. Oil has been discovered over an ever increasing area; older pools have dropped from spectacular to modest totals, but new ones have come to take their place. The Mid-continent field, most prolific of all, has stretched out over five states. Oklahoma and Texas (most of which is classed with the Mid-continent region) each produced well over one fourth of the national total in 1928. The Rocky Mountain oil region, at first confined to Colorado, now has its chief center in Wyoming, and is reaching into Montana. The California field has not pushed outside that big state or north of its center, but pools have multiplied, and in most recent years the output has been greater than that of any other state, making up from one fourth to three tenths of the country's total. In 1928, however, California occupied third place.

Notwithstanding all the expansion of American oil territory down to this time, there can be no certainty that further large fields will be discovered, although the outlook is not so restricted as it appeared a few years ago. Only the steady widening of productive area makes possible an increase in aggregate flow without advance in costs. Usually each pool rushes quickly to its peak and then declines — at first rapidly, then more slowly. It is believed that, at a sufficiently high price, new methods of extraction could for a fairly long period maintain a large output in oil territory already known. At present reliance is placed on ordinary pumping after the first short burst when many of the wells are "gushers." The greater fraction of the oil, perhaps more than three fourths, cannot by this simple and inexpensive procedure be sucked from the reluctant sands many hundreds (sometimes several thousands) of feet below the surface. Several other methods, all involving heavy cost of investment and operation, have been proposed for dragging forth more, much more, of the deep-sunk treasure. Another promise for the future lies in the extraction of oil from the vast shale deposits in the Rocky Mountain region. Here also cost is the only obstacle.

Neither of these expensive procedures is likely to make much progress until the oil deposits of other parts of the world have been far more thoroughly tested and exploited than hitherto. Ocean transport is cheap; and if American and other capital is given freedom to develop the industry in South America, Asia, and Africa and to market the product where the demand lies, the world's needs may perhaps be met for a long time. In the meantime new discoveries of means of converting coal into liquid fuel open still other vistas. There are also possible avenues for supplying internal-combustion engines by the cheapening of alcohol and by the use of explosive gases, either generated as used or carried in containers under compression. Notwithstanding all these possibilities the fact remains that it behooves the United States to avoid waste of its wealth of liquid fuel.

The drilling of oil wells is a highly speculative enterprise. Not only does many a pool "peter out" with disconcerting suddenness, but many a well, even though drilled close to those already producing, may go deep into the earth at a cost of tens of thousands of dollars only to prove a "dry hole." "Wildecutting" (testing unproved territory) brings hosts of disappointments. Yet so great and quick are the gains from a lucky strike that thousands of individuals and concerns, with or without experience and with or without reserve capital to withstand temporary losses, are always ready to play the fascinating game. In the earlier history of the oil industry the large corporations which operate pipe lines and refineries generally stood aloof from the production of crude oil, preferring to leave the risks to those more speculatively inclined. In more recent years, however, these concerns often drill wells on an extensive scale. Their abundant capital and their skilled geologists afford a large measure of safety.

The quality of petroleum varies decidedly. The lighter oils contain a larger proportion of the more valuable products. Some crudes contain paraffin, a highly prized commodity; others have an asphalt base. As respects quality

of oil the several fields rank roughly in the following order : Mountain, Appalachian, Mid-continent, Lima-Indiana and Illinois, California, and Gulf. Improvements in methods of refining the heavier crudes have served in part to cut down the disparity in the value of the several grades.

Transportation of Oil

Petroleum is transported in far greater quantities than any other liquid except water. Naturally, therefore, special methods of carriage have been evolved, such as the pipe line, the tank vessel, the tank car, and the tank truck.

Practically all crude oil is piped from the wells to the refineries or to the seaboard. Pipe lines are also sometimes used to transport finished products. There are over ninety thousand miles of pipes, the longest extending all the way from Texas to New York Harbor. The volume moved by this underground transport system is in the neighborhood of a hundred and fifty million tons annually, an amount equal to well over one tenth the tonnage of all commodities carried by rail.

It is stated that if a single barrel of oil is exploded in the Diesel type of engine, which is usually employed, it will drive ten thousand barrels from one pumping station to the next, ordinarily about forty miles. The cheapness of pipe-line transport of crude oil as against rail transport of finished products has much to do with the location of the refineries. Many of the largest are at or near big cities or at seaboard points, far distant from the oil fields. The pipe-line business is chiefly in the hands of a few great companies closely affiliated with refining concerns. The pipe-line company must be in a position to build with the utmost rapidity lines and tanks to take care of the sudden outburst of new pools. Formerly there was much complaint among producers that the pipe-line business was monopolized ; that they had no choice except to sell their product to the single buyer. At present, however, there are in the major fields a number of pipe-line companies offering the sellers a choice of outlet.

The tank vessel has become a very important adjunct of the industry. There are nearly four hundred ocean-going "tankers" of American registry, representing over one fifth of the total United States sea-going merchant marine in capacity¹ and a much larger proportion of the tonnage actually in operation. Tank cargoes (mainly petroleum) make up in weight about three tenths of the imports of the United States from foreign countries and one fourth of the exports. The use of a special type of vessel makes for very cheap carriage. Approximately one hundred and forty thousand tank cars carry petroleum products on the American railways, nearly 6 per cent of the number of cars of all classes. Most of these cars belong to the refining companies. A multitude of tank trucks are engaged in local distribution.

The Refining and Marketing of Petroleum Products

Crude petroleum is a highly complex mixture of hydrocarbons. It may be separated by distillation into fractions of different densities and adapted to a variety of uses. Scientific research has given to the refiner wider leeway than formerly as to the proportions of the several products. He is still held within limits, however. Some of his products must be sold for less than the cost of the crude oil. The industry furnishes a perfect example of the principle of joint costs. The proportion of the cost of crude oil that can be assigned to the several products must necessarily depend on their relative prices, and these prices, in turn, vary according to conditions of demand.

Apart from numerous by-products, the refineries turn out four major classes of oils (Fig. 64, A). The naphtha group (principally gasoline) is the first to condense from the stills. Gasoline (apart from that derived from natural gas) makes up (1927 data) about 35 per cent of the crude oil, and is much

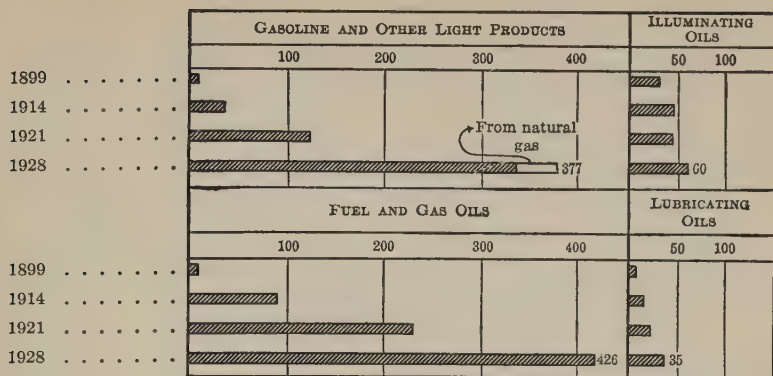
¹ This ratio relates to vessels of 1000 or more gross tons each.

the largest product in value; the quantity produced (including that from natural gas) trebled between 1921 and 1928. Kerosene, or illuminating oil, formerly the most important derivative, now ranks third in quantity and last in value. Fuel and gas oils constitute not far from half the total volume, but are worth much less per gallon than the other oils; they are in a sense a residual, to be reduced to the lowest proportion possible. Gas oil is used to enrich manufactured gas, giving it greater heat value. Fuel oil is of particular importance for ocean vessels; it gives the maximum of energy with the minimum of weight and thus increases cargo capacity and cruising radius. It is now coming into wide use for household heating.

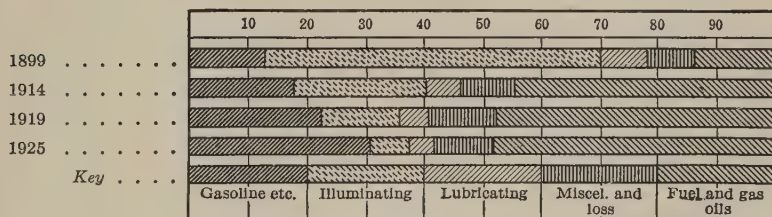
Least of the four major groups of products in quantity but highest in value per gallon are the lubricating oils. These are adapted to every type of machinery and to all conditions of temperature. Of all the uses of petroleum that of lubrication is perhaps the most essential to national well-being. Other important products of petroleum are paraffin, petroleum jelly, greases of various sorts, tar, and coke.

The changes that have taken place from time to time in the proportions of the several products derived from crude oil reflect both the progress in technique and the development of new demands. In the early days petroleum was thought of chiefly as an illuminant. The lightest products were often thrown away; there was temptation to mix an undue proportion of them with the illuminating oil, to the danger of the consumer. With the invention of the internal-combustion engine and the multiplication of automobiles the demand for gasoline rose and became more and more dominant. The technicians learned by "cracking" (distillation under pressure at high temperature) to get more and more of this precious volatile fraction — at the expense of kerosene, but with a consequent increase in the proportion of the fuel and gas oils of lower gravity and market value. At the beginning of the century illuminating oil accounted for 58 per cent, and gasoline for only 13 per cent, of the volume

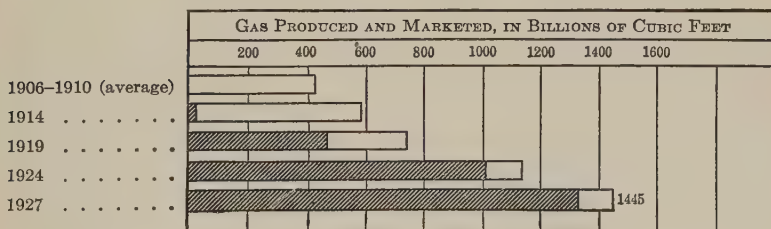
A. PRODUCTION IN MILLIONS OF BARRELS



B. PERCENTAGES DERIVED FROM CRUDE OIL



C. NATURAL GAS AND NATURAL-GAS GASOLINE



D. NATURAL-GAS GASOLINE PRODUCED, IN MILLIONS OF BARRELS

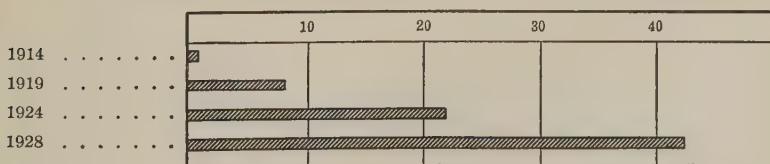


FIG. 64. Diagram showing petroleum products and natural gas

In section B natural-gas gasoline is disregarded ; in section C the shaded portion of the bars represents gas treated for gasoline. Barrels are of 42 gallons

of crude oil run to the stills. The two were then about the same in price per gallon. At the present time the output of gasoline (including gasoline derived from natural gas) is over six times that of illuminating oil, and it commands a considerably higher price.

For reasons already suggested the refining industry is much more widely distributed geographically than the production of crude oil. Large quantities of petroleum are refined in or near New York and Philadelphia. Other plants are located in the central interior, especially at or near Chicago, St. Louis, Kansas City, and Tulsa. Texas refineries, situated mostly along the seaboard, handle great quantities; and another big fraction of the national output of oil is refined in California, where, owing to the scarcity of coal, the abundance of petroleum, and its relatively low gravity, the proportion of fuel and gas oils in the product is much higher than elsewhere. The four refining areas named above are roughly equal in volume of crude oil handled.

The cost of refining, despite the rather intricate processes, is low. Refining ranks among the very largest manufacturing industries in gross value of products but not in the value added to materials nor in the number of wage-earners. A typical refinery presents a bewildering multiplicity of stills, retorts, condensers, filters, agitators, pipes, tanks, and other equipment. A recent innovation is the bubble-tower still. This renders the greater part of the process of distillation continuous, and avoids the necessity of stopping stills, allowing them to cool, and removing the residues. The system also conserves the heat in the greatest possible measure.

Although the great bulk of the output of the American refineries goes to the voracious home market, petroleum products are a very large item in export trade; until 1929, when automobiles and machinery stood second and third, they yielded place only to cotton in value. The total (including crude oil) in the last few years has been roughly half a billion dollars annually. About one seventh of the gasoline, one ninth of the fuel and gas oil, and one third of the illumi-

nating and lubricating oils are shipped abroad. American oils are sold throughout the entire world. The big exporters have developed an elaborate system of direct marketing. To countries with inadequate roads it is necessary to ship in tin cans; the empty tins find many and strange uses in remote villages of Asia, Africa, and South America. The proportion of American petroleum seeking foreign markets is much lower than it was forty or fifty years ago, but in spite of this the exports have grown enormously, multiplying over six times in quantity since 1900.

The petroleum industry is characterized by large-scale operation and widespread practice of integration. The Standard Oil Company was long the largest industrial concern in the country and was almost the first to unite the two principles of "horizontal" and "vertical" combination. Other great oil concerns have since come into being and have followed in the same footsteps. Any one of several companies whose names are familiar on filling stations in hundreds of cities and towns may be drilling for oil in far-away Texas or California or Venezuela. Between the well and the consumer the company will very likely operate a maze of gathering pipe lines, one or more trunk systems of pipes, refineries at strategic points, a fleet of tank vessels, and some thousands of tank cars and tank trucks, thus tying together every branch of the business. The same company too may have marketing facilities far flung over foreign lands. There are, however, many concerns which confine themselves to one or two branches of the business.

Natural Gas

A natural by-product of petroleum is gas, which may be considered as constituting that fraction which is too volatile to continue in liquid form beneath the earth's surface. Wherever oil is produced, gas comes along with it. It is the gas which causes so many oil wells at the outset to spout forth as "gushers." However, gas passes more readily

through the earth's strata than oil, and gas wells are often scores or hundreds of miles from the oil fields which presumably originally gave birth to the gas.

Gas was formerly allowed to go to waste, but today it is eagerly sought and is conserved as fully as the physical conditions permit. The statistics of so-called "production" represent only the gas that is actually gathered into pipes. The conserved output is now about 1,500,000,000,000 cubic feet annually, or three or four times greater than the quantity of "artificial" gas generated by gasworks (see Fig. 64, C). The heat value of this gas output is equal to about 65,000,000 tons of coal, and its money value at the point of consumption is more than \$300,000,000, placing this third in rank among the mineral products of the country. The quantity of gas conserved at present is three or four times as great as it was twenty years ago. About a fifth of the output is used for household light and heat, and the remainder for industry, including the production of carbon black (used for paint and similar purposes), the operation of oil wells, oil pipe lines, and oil refineries in the fields, and the generation of process heat and power in factories. One of the notable recent contributions of industrial technique to the utilization of natural resources is the practice of extracting gasoline from natural gas, a process which leaves the gas a wholly satisfactory fuel and at the same time produces many millions of dollars' worth of the explosive liquid (this item is shown separately in Fig. 64, A).

The geographical distribution of gas production differs considerably from that of oil. West Virginia and Pennsylvania rank high, and only in the last few years have been eclipsed by the great Mid-continental oil states and California. Though gas can readily be piped long distances, the bulk of the output is consumed in the same state where it is produced. The most important exception is the piping of large quantities from West Virginia to Pennsylvania and Ohio and from Oklahoma to Kansas.

SECTION 6. IRON

Iron is the most important material of capital goods, which play so vast a part in modern economic life. The United States produces not far from half the iron made in the entire world, the proportion for pig iron averaging about 46 per cent and for steel ingots and castings 49 per cent. The great bulk of the output is derived from domestic ore, although on account of the cheapness of ocean transport a few ironworks situated along the eastern seaboard import ore, mainly from Cuba and Chile. As we have seen, the American iron-ore deposits are perhaps the richest in the world. The United States first outstripped England and Germany in iron production about the year 1900. It now has more than three times the German output and more than five times that of Great Britain (see Fig. 65, *B*). Although the war temporarily added greatly to the demand for American steel, the present production shows less relative increase over the years just before the war than had taken place during the same length of time immediately preceding. The fundamental cause of the leadership of the United States is the enormous domestic demand resulting from the wealth of the country and its ability to expand its capital equipment rapidly.

The Great Lakes are a dominant factor in the iron industry (see Chapter XI, Section 8). Without the extreme cheapness of ore transport by lake the total output could scarcely have reached its present proportions, and the location of the business of mining ore or of manufacturing iron, or of both branches, might have been very different. Although on the average it takes about two tons of iron ore to make one ton of pig iron, it also takes about one and one-half tons of coal (counting the coal equivalent of the coke used). The richest ore deposits of the North are near the western end of Lake Superior, whereas the best coking coal is in Pennsylvania, Eastern Kentucky, and West Virginia, not far from the other end of the thousand-mile stretch of the Great Lakes. For

this reason and likewise in view of the fact that demand for the finished products (the transportation of which is also a major factor in costs) is greatest in the Eastern and central states, it is cheaper to bring the ore to the coal than to bring the coal to the ore. Except in Alabama no great amount of pig iron is smelted much more than a hundred miles from the southern shores of Lake Erie and Lake Michigan.

In the earlier history of the industry most of the ore used was from local deposits in Pennsylvania and other Eastern states; these deposits are by no means exhausted, but the higher iron content of the Lake Superior ore and the ease with which it is mined have caused them to be largely abandoned. At present about five sixths of the ore production is in the Lake Superior region, with Minnesota dominating and large quantities coming from upper Michigan (see Fig. 59, *B*). The port of Duluth-Superior ships such an enormous tonnage of ore that among the ports of the world it ranks second only to New York in total weight of traffic handled. Apart from the Lake states the chief present source of iron ore is Alabama, where the ore lies close to coal and where, in consequence, an important manufacturing center has developed at Birmingham and vicinity.

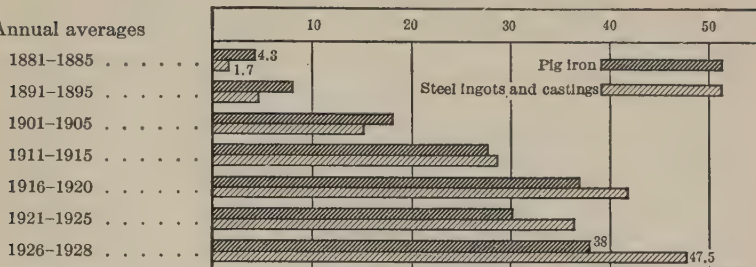
The iron ore of the United States is easy to mine and is of higher metal content than that of most other countries. It lies in great beds often close to the surface and, unlike coal, these beds, in the Lake Superior region, are not broken by intervening layers of rock. The larger part of the output is from open-cut mines—the surface material is scooped off and the mine becomes like a quarry. Steam shovels, often with little need for blasting, throw the ore directly into trains which weave their winding way to the bottom of the great pits. The iron content of the ore now being mined usually ranges between 40 and 60 per cent, the average being about 50 per cent. The average value of ore at the mine is less than three dollars per ton.

Transportation of Lake Superior ore has been developed to an extraordinary pitch of efficiency. Long trains of heavy

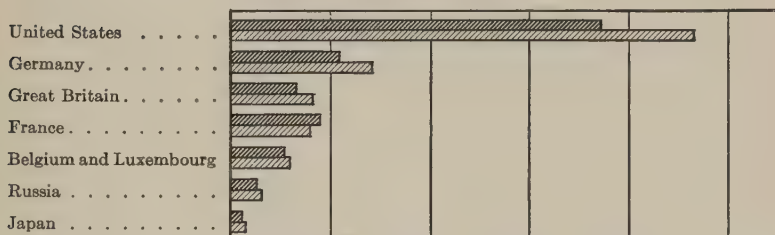
PRODUCTION OF IRON AND STEEL, IN MILLIONS OF LONG TONS

A. GROWTH OF PRODUCTION IN THE UNITED STATES

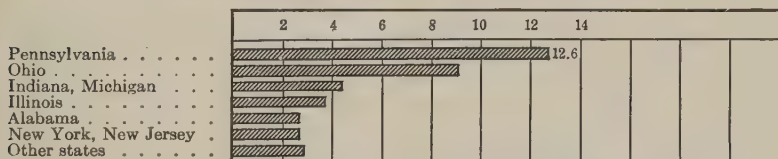
Annual averages



B. PRODUCTION OF PRINCIPAL COUNTRIES



C. PRODUCTION OF PIG IRON BY STATES (1926-1928 AVERAGE)



D. PRINCIPAL ROLLED-STEEL PRODUCTS (1926-1928 AVERAGE)

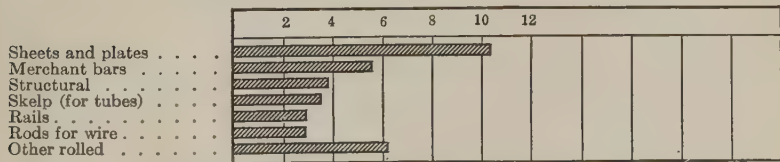


FIG. 65. Diagram showing the annual production of pig iron and of steel ingots and castings

Note that sections *C* and *D* are on a different scale from the other two sections. Section *B* relates to the mean of the years 1926 and 1927, except that for Great Britain the mean of 1925 and 1927 is shown, 1926 being abnormal on account of the coal strike

cars, aided by the considerable down grade, carry the ore the fifty to eighty miles to the port, dumping it there into elevated hoppers along great docks, whence it is discharged by gravity directly into the ore-carrying vessels. These are specialized for this work; they are of great size but moderate draft, and of fair speed. The charges for carrying are but a small fraction of the cost of rail transportation (see Chapter XI, Section 8). At the lower lake ports there are also remarkable modern devices for prompt and cheap unloading.

The manufacture of iron involves three major processes: (1) the smelting of the ore in the blast furnace to make pig iron, (2) the transformation of the greater part of the iron into steel by means of the Bessemer converter or of the now more common open-hearth furnace, and (3) the shaping and further elaboration of the steel and of that part of the pig iron which is not converted. Large and increasing quantities of steel are made by the remelting of old material; it is for this reason that, in contrast with earlier decades when pig-iron production exceeded that of steel, the steel production is now much the larger. As the quantity of iron and steel in existence in the country further increases, the remelting of old stock will grow still further in relative importance. Although most steel is obtained by applying relatively inexpensive processes to the pig iron, large and increasing quantities of costly special steels are made, alloyed with manganese, nickel, chrome, tungsten, titanium, vanadium, cobalt, and other metals. By alloying and manipulation steel can be given a wide range of characteristics: it can be made malleable or brittle, hard or soft, suited to every variety of use demanded by the manifold requirements of modern industry. The output of crude steel in the last few years has been about two thirds greater than just before the World War.

The bulk of the steel undergoes a process of rolling through powerful mills that reduce it to bars, plates, sheets, rails, rods, and other forms (see Fig. 65). Each of these classes is made in many variations of shape and size. Some of the steel, and much of the unconverted pig iron, is cast into vari-

ous forms, and some of it is shaped by forging under huge hammers. Certain of the rolled products are ready for final use, as in the case of rails, but others undergo further transformations in the steel-works themselves or in other plants of the steel group; great quantities are drawn into wire or turned and welded into pipes and tubes. A great part of the output of the iron-and-steel industry proper is turned over to other industries as material; the machinery, vehicle, and stove and furnace industries are among the many which base their activity mainly on iron and steel. The iron-and-steel industry itself (that is, the two census classifications of blast furnaces and rolling mills combined) ranks fourth or fifth among American factory industries in point of net value added to materials by manufacture.

The various stages in the production of iron and steel are largely tied together by great integrated industrial corporations. There are several such concerns, each of which has its own mines, ore-carrying vessels, blast furnaces, steel-works, rolling mills, and plants for still further elaboration of the materials, and perhaps coal mines and coke plants as well for supplying fuel. Relatively little pig iron or crude steel is sold in the open market, though there are some concerns which make a specialty of this business. A large proportion of the crude iron is not cast into pigs at all, but passes to the steel converters in liquid form; often, too, the steel ingots are not allowed to grow cold before they are subjected to further processes. The whole industry is conducted on an imposing scale and has attained a high degree of efficiency. The amount of capital used is enormous.

Pennsylvania was long the only important state in the steel industry; in the early days it was the chief source of the ore as well as the coal. This early lead, together with permanent natural advantages and proximity to Eastern markets, has enabled the state to retain first place, although its ore now comes mainly from far away. Pennsylvania produces about a third of the country's pig iron; Pittsburgh and the neighboring towns are the most important steel

center of the world. But in recent decades cities lying on the Great Lakes have pushed forward rapidly — Buffalo, Cleveland, Lorain, Gary, and Chicago especially. There is also a considerable steel industry in eastern Pennsylvania and Maryland which uses local and imported ores. The only other major center is that around Birmingham, Alabama. The production of pig iron is shown by states in Fig. 65; the steel industry as a whole is distributed not very differently.

Iron is an extremely important factor in the export trade of the United States. It is true that the exports of the direct products of the blast furnaces, the steel-works, and the rolling mills are only a relatively small part of the domestic production, and that each of the four leading industrial countries of Europe exports more heavy iron and steel, even in absolute tonnage; it is true also that the foreign sales of such products are no larger, in weight, at present than before the World War; but steel is the basic material of machinery, motor cars, and many other advanced products of which the United States is the world's greatest exporter and of which the shipments to foreign countries have increased and are still increasing rapidly. The export of the so-called heavy iron-and-steel products themselves averaged about 2,000,000 tons annually during the period 1923–1927, but in 1928 the total reached over 2,800,000 tons and in 1929 still more. The annual value of these exports ranges from about \$150,000,000 to \$180,000,000. The largest markets are Canada and Japan, but considerable quantities are sold to many countries of Latin America and Asia.

SECTION 7. THE NONFERROUS METALS

Copper

The growth of the application of electricity, with its multitude of ramifications, has given to copper, for thousands of years familiar in other uses, an altogether new and immense importance. American production has increased thirty-fold

in half a century and has trebled since 1900; it amounts to over 1,800,000,000 pounds (1928). The mines of the United States produce somewhat more copper than all the rest of the world put together. In addition its smelters and refineries handle great quantities of ores, concentrates, and

THOUSANDS OF METRIC TONS (2205 POUNDS)

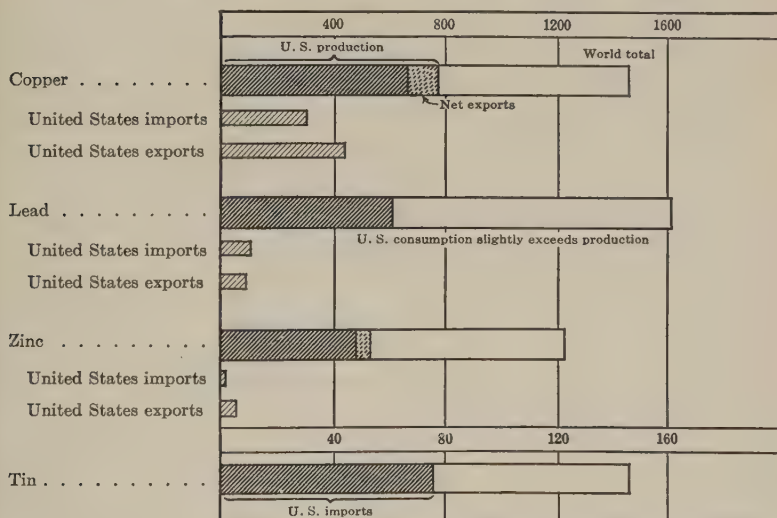


FIG. 66. Diagram showing the production, imports, and exports of copper, lead, and zinc in the United States compared with the world's total production, together with imports of tin

The figures represent means of the three years 1925-1927. The bars for copper, for example, show that the world's total production is about 1,460,000 metric tons; United States production about 775,000 tons, exports about 435,000, imports 310,000, and the United States consumption about 650,000 tons. Consumption is not shown in the case of lead; it slightly exceeds production

crude copper imported from Mexico, Chile, Canada, and elsewhere in the Western Hemisphere, and from Africa, which has recently become a considerable factor in the world's supply. The United States consumes nearly half (about 45 to 47 per cent) of the world's output of copper, but owing to these imports it is able to export over 1,000,000,000 pounds annually, valued at approximately \$150,000,000. Copper is

one of the biggest exports of the country, usually ranking eighth in the list.

Inventions and improvements in methods of separating the metal from the ore, making possible the use of lower-grade material, have played quite as important a part in adding to copper output as has the discovery of new deposits. Copper ore, which often contains other metals in smaller quantities, is usually of such low metallic content that it must be either concentrated or smelted where it is produced. The smelting requires much heat and power; in some cases hydroelectric power has come into use. The ultimate refining is often done in some distant state, especially since there is need for refineries near the great sea-ports to handle imported materials and to refine old metals. Thus there are important refineries in New Jersey, New York, Maryland, and California, states which produce little or no ore.

Half a century ago American copper-mining was virtually confined to the upper peninsula of Michigan. By 1900 Montana had taken first place, and Arizona was creeping up on Michigan. Most of the expansion since that date has been in Arizona, now by far the leader, with about two fifths of the national output; in Utah, which now ranks second; and in Nevada, New Mexico, and the outlying territory of Alaska. Montana produces less than it did a quarter of a century ago (see Fig. 59, *C*). Next to the United States the leading countries in copper production (reckoning according to the copper content of ore mined) are Chile, Belgian Congo (a new and very rich field), Canada, Japan, Mexico, Spain, and Peru. Germany is the only European country prominent in factory industry that produces appreciable quantities of copper.

After the copper leaves the refinery in ingot form its further manufacture constitutes no such clearly defined industry as that of the steel-rolling mills. The product is easily shaped, and is turned into many forms in factories of different types. Alloyed with zinc to form brass or with tin to form bronze,

copper finds many uses for which the softer pure metal would not serve. The biggest single consumer of copper is the electrical industry.

Lead

The dominance of the United States in the world's supply of lead is somewhat less marked than in the case of copper. It produces from 35 to 40 per cent of the world's total from its own mines, and, as with copper, smelts and refines a great deal of imported ore and "base bullion," usually containing silver along with the cheaper metal. American exports of refined lead approximately counterbalance these imports. The production of the American mines has much more than doubled since 1900, and the world's total output has grown in similar ratio. Even so, supply has not kept pace with demand, swollen by the increased use of lead in paints, in sheathing for electric cables, in storage batteries, and for many other purposes. It has become harder and harder to discover new lead deposits anywhere in the world, and those known are tending toward exhaustion. However, the improvement of methods of handling complex and lower-grade ores and the increasing use of substitutes in making paints are prolonging the life of the resources.

Lead is found in the earth in various forms and in combination often with other metals, especially with zinc or silver, or with both; consequently methods of mining and smelting vary greatly. The largest source of the world's supply is in the triangle comprising corners of the states of Missouri, Oklahoma, and Kansas, Missouri being much in the lead (see Fig. 59, D). Next to Missouri stands Utah, with an output two or three times larger than in 1910, and Idaho. The latter is finding difficulty in maintaining its production, but recently it took on a new lease of life through the use of the method of "selective flotation" for separating metals from ore. Other important lead-producing countries are Mexico, Canada, Spain, Germany, Belgium, Australia, and India (Burma).

Zinc

This metal is used for coating, or "galvanizing," iron to make it rust-proof, for alloying with copper to make brass, for paints, for electric-battery plates, and for many other purposes. As with the other metals, industrial progress has multiplied demand. American output, which is from 40 to 45 per cent of the world's total, is five or six times larger than it was at the beginning of the century. Unlike copper and lead, very little crude zinc is imported for treatment in the United States. Exports vary from 6 per cent to 15 per cent of the annual output. Zinc ores are seldom without some admixture of lead or other metals.

Zinc is the only nonferrous metal of which any appreciable quantity is produced in the East. New Jersey ranks third among the states in output. Oklahoma, which fifteen years ago was unimportant, is now by far the leader, with from 30 to 40 per cent of the national total (see Fig. 59, *E*). Kansas ranks second. Missouri, formerly the principal producing state, has seen its output dwindle. The zinc of these three Mid-continent states lies in the same general triangle as the lead, but is differently distributed. Several of the Mountain states produce zinc in rather unsteady fashion from mixed ores, the largest output being in Montana. Wisconsin and Tennessee contribute in a rather small way. Foreign countries of importance in the production of zinc include Great Britain, Poland, Belgium, Germany, France, Canada, Australia, and several countries in Latin America. Of these, Belgium has the largest output.

Gold, Silver, and Platinum

But for its employment as money gold would have little economic significance. Not over one fourth of the output goes into jewelry or other industrial uses, and these uses are far from essential to human well-being. Gold-mining, except on the South African Rand, now long the major source, has

always been the most speculative of human enterprises, costing more in money, effort, hardship, and even crime than the value torn from the earth. Were it not for the fact that gold (especially now that it is mainly held in reserve and circulates but rarely from hand to hand) is almost imperishable, so that the annual production changes the existing stock but little, the vagaries of that production would make the yellow metal the most precarious possible basis for currency. As it is, the problem of a steady supply to meet mounting demand is a difficult one.

The United States, including Alaska, produces now less than half as much gold as some twenty years ago, when Nome, the Klondike, and Goldfield (Nevada) were booming, and less even than in the middle of the last century, when the California gold rush was on. Its production is only about one eighth of the world's total, South Africa furnishing over half. The rapidly growing Canadian mines are perhaps the only promise of a maintenance of the present rate of world production. The chief American states in gold output are California, Colorado, Alaska, South Dakota, Arizona, Nevada, and Utah, with relatively little elsewhere. In the United States gold is now obtained chiefly not from casual placers, with their romantic "strikes," but from the systematic dredging of large alluvial areas, from deep mines, and as a by-product from the mining of other metals.

Silver is fully as often a by-product of mines seeking chiefly "baser" metals as it is a primary product. It is partly for this reason that the output, both in the United States and elsewhere, is steadier over long periods than the output of gold. The production is somewhat affected, however, by variations in price, and these are influenced largely by the actions of governments regarding the use of silver as a major currency or a subsidiary one. The demand for decorative and other commercial purposes has shown no such expansion as that for the cheaper metals. In terms of weight, as distinguished from value, the production of silver in the United States, taken by five-year periods, has changed

but moderately in more than forty years ; it is now a little less than just before the World War. The principal producing states are Utah, Montana, Idaho, Arizona, Nevada, and Colorado. The country produces about one fourth of the world's total. Mexico outranks the United States, and other sources are scattered in all the continents.

Platinum is of considerable importance for certain technical uses, such as making retorts, and is also increasingly employed in fine jewelry. The United States produces a moderate quantity, but imports about twice as much. The largest producing country is Russia.

CHAPTER X

MANUFACTURES

SECTION 1. GENERAL ASPECTS

The United States has forged ahead of all other countries in manufactures. The factory smokestack has become as conspicuous in the landscape as the planted field. Huge cities and bustling industrial towns bear witness to the great proportion of the population that gains its living by fabricating goods. Manufacturing industry gives employment to practically as many persons as agriculture, and it is the largest of the branches of production from the standpoint of value created.

In 1927 the gross value of products reported by factories was nearly \$63,000,000,000. This amount conveys little meaning in itself (see Fig. 67). Somewhat over one third of it represents duplication due to the use by one factory of partly finished products from other factories. According to approximate estimates the net value of the products as they leave the factories on the way to the consumer is about \$40,000,000,000. Of this sum, in turn, roughly \$13,000,000,000 consists of the cost of materials (including fuel and electric current) supplied by farms, mines, and forests or imported from abroad. There still remains the huge sum of over twenty-seven billions (\$27,585,000,000 in 1927) as the actual contribution of the factories themselves.

The biggest item that enters into the value created by manufacturing industries is wages and salaries, which amount to over fourteen billions, or a little more than half the net total. Other factors are not shown separately in the returns. They include various expenditures, totaling several

billions, for incidental supplies, repairs, rent, legal service, insurance, advertising, and the like, together with provision for capital and management. The latter covers depreciation of plant, interest and amortization on borrowed money, dividends and undistributed profits of corporations, and profits and "wages of management" of individual proprietors and members of unincorporated concerns.

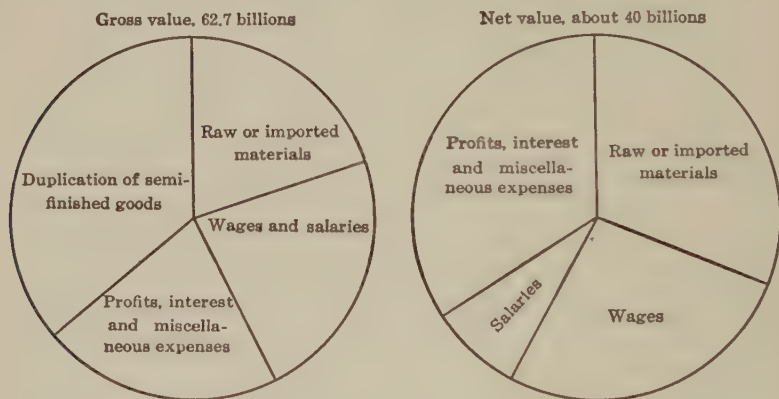


FIG. 67. Diagram showing the gross and net value of manufactures and the factors that enter into them (1927)

The circle to the left represents the gross value, including the large duplication due to the use of partly finished products of one factory as material for another. The amount of this duplication is known only approximately, and this is true also of the value of the materials from outside sources — raw and imported materials. The circle to the right shows the elements that enter into the net value of manufactures, excluding the duplication

American factories give employment to about one fourth of all those who work for their living. The total number is close to 10,000,000, including about 200,000 individual owners, 1,300,000 salaried persons, and 8,350,000 wage-earners. The relatively large number receiving "salaries," as distinguished from the manual workers on the "wage" basis, is an indication of the high organization of modern business (see Chapter V, Section 8). Although many of these are highly paid executives and technical experts, the majority receive pay little if any higher than the wage-

earners; they are foremen, inspectors, bookkeepers, clerks, stenographers, and similar employees. The average annual rate of pay of the salaried class is about \$2500 as against \$1300 for wage-earners. Their aggregate compensation is equal to about three tenths of the amount paid in wages.

The significance of the great employment of mechanical power in the factories of the United States is discussed in Chapter V, Section 4. It is sufficient to state here that the capacity of the prime movers in manufacturing industry, plus that of the electric motors run by purchased current, is about 40,000,000 horsepower (39,035,000 in 1927), or 4.7 horsepower for each wage-earner. The total is somewhat exaggerated by the inclusion of some virtually obsolete and idle power equipment.

Most countries of the world have nothing corresponding with the general factory census of the United States. It is clear, however, that the value of factory output in the United States — that is, the value added to materials by the process of manufacture — is far greater than the combined total for Great Britain and Germany, the two countries which rank next in manufacturing industry (see Fig. 68).

In the United Kingdom the value added to materials by manufacturing industry in 1924 was reported as about \$5,700,000,000. This is barely one fifth as large as the 1925 figure for the United States. The number of wage-earners and salaried employees in the British factories was about 5,500,000¹ as compared with some 9,750,000 in the United States. The average value added to materials in the American factories was thus over two and one-half times as much per worker as in those of the United Kingdom. This great difference in value of output per worker corresponds with the wide disparity in wages pointed out in Chapter I, Section 2. The value of factory output in Germany, which has taken no census of production, can be roughly estimated. In 1925

¹ Including an estimate of the number of proprietors and salaried employees. The number of wage-earners was 4,893,000 as compared with 8,382,000 in the United States.

the number of persons of all classes in German factories, excluding (by estimate) the small shops (especially those using no mechanical power), was between 8,500,000 and 9,000,000. Assuming that the value added to materials by manufacture per worker was substantially the same as in the United Kingdom, we arrive at a total in the neighborhood of \$10,000,000,000. The factories of Great Britain

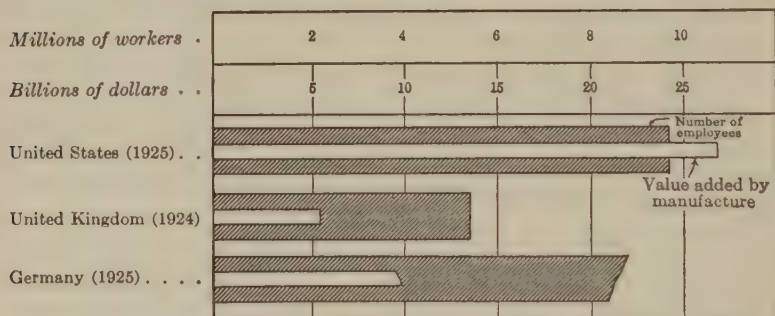


FIG. 68. Diagram showing the factory industries of the United States, the United Kingdom, and Germany

The broader bar represents the number of employees, the scale being shown at the top; the narrow bar represents the value added to materials by manufacture. The scales are such that if the average value per worker were \$2500 the two bars would be of equal length. The figures for Germany are approximate only (see text)

and Germany together thus aggregate a value scarcely exceeding \$16,000,000,000 as compared with \$27,000,000,000 for American factories.

One explanation of this wide disparity is perhaps found in the fact that American factories use much more mechanical power than those abroad. The capacity of prime movers (including electric motors operating on current furnished from the outside) in British factories in 1924 was a little over 11,000,000 horsepower, and in German factories (1925) about 13,400,000. The figure for the United States in 1925 was nearly 36,000,000 horsepower. Germany and the United Kingdom together have about 50 per cent more wage-earners in factories than the United States, but the United States has 50 per cent more power equipment than those two countries.

No other country of the world even approaches Germany and the United Kingdom in factory production. It is entirely possible that the output of American factories is equal to that of all Europe put together.

The High Degree of Elaboration of Factory Products

A large proportion of the articles turned out by the factories of the United States are very highly elaborated. The raw materials have been subjected to great transformation. This characteristic of American industry is evidenced by statistics already presented, showing that the net value added to materials in the factories is fully double that of the materials themselves. Further analysis serves to emphasize this point.

In the first place, a distinction must be made between the manufacturing of foodstuffs and of other goods. It is a fortunate circumstance that foodstuffs, the most essential of all commodities, need only simple processes to prepare them for sale. In the food factories the value of the materials used is from two to two and one-half times greater than the value added to them by manufacture. The other manufacturing industries, taken together, add to materials a value from three to four times as great as that of the materials themselves.¹

In the second place, it should be noted that the large expenditure for fuel and purchased electrical power is included in the census returns with the cost of materials. In a sense it would be more proper to treat it as a part of the value added to materials. Fuel and power are agencies by which the constituent materials are transformed, though they are, of course, not agencies supplied by the factories themselves. If these items be excluded altogether (that is, counted neither as materials nor as "value added"), the value contributed by nonfood factories is roughly five times that of the basic materials on which they work.

¹ These ratios are based on estimated total values of materials and products exclusive of duplication, not on the gross totals ordinarily published.

Even this high average ratio fails to suggest the degree of elaboration of most manufactured commodities; for, apart from the industries which manufacture foodstuffs, there are a few others of large output in which only inexpensive processes are required. Thus in petroleum-refining the separation of the crude oil into fractions for different uses, though it requires high technical skill, costs much less than the raw material. The fertilizer industry and the industries that express oil from cotton seed and other seeds and nuts add relatively little to the value of materials. If a few branches of this character are excluded, it will be found that in the remaining industries the value added by manufacture is about six times that of the materials used.

Years ago someone worked out the ratio between the value of iron ore and the value of watch hairsprings. It takes several ciphers to express the multiplication due to the contribution of labor, skill, and capital in the factory. But hairsprings are scarcely a typical article of manufacture. More significant is the fact that in the case of many far more bulky and more important products transformation immensely increases the value of the materials that come to their making from farm, forest, and mine.

Take the case of motor vehicles, into which, with the enormous growth of output, several million tons of iron ore enter annually. The relative values of iron per ton at various stages of elaboration are somewhat of the order shown below (precision is neither possible nor essential to the significance of the comparison):

	VALUE PER TON OF IRON
Ore in the ground	\$2
Ore at the blast furnace, after mining and transportation	10
Pig iron	20
Crude steel, bars, rods, sheets, etc.	40
Iron in the finished automobile, not counting the value added to other materials	\$300-\$1000

It is safe to say that in automobiles, in many classes of machinery, and in many other articles wholly or chiefly of

metal, manufacturing processes have multiplied by tens or even hundreds the value of the ores of the metals used.

Of course instances of manufactured articles worth far more than their constituent materials are by no means confined to the United States. Inasmuch as methods are often less efficient in foreign countries than in this country, the cost of transformation of a given article in such countries may, despite lower wages, bear a greater ratio to the value of the materials. Moreover, many products of Old World industrial art (lace or filigree work, for example) are very highly wrought by the most expensive of means — hand labor unaided by machinery. But there is scarcely another country in which manufacturing industry considered as a whole is so elaborative as in the United States — in which the total value added by all factories together bears so high a ratio to the original cost of materials. In most countries the industries of high elaboration employ a relatively small number of persons, and the manufactures are mainly those of a simpler character. This is true because only a small fraction of the population can afford any considerable number of highly elaborated things. The advanced character of American industry finds its explanation in the rich resources and high productive capacity of the country.

Multiplicity of Industries and Products

A highly advanced manufacturing industry catering to high standards of demand naturally has a very wide variety of products. The United States does not specialize on a few lines only. Most of the great American consumption of manufactured articles is supplied by American plants. Apart from foodstuffs the domestic output is roughly forty times greater than the import (counting only import of finished manufactures not requiring further elaboration). A large proportion of the articles of manufacture imported are such as demand a great amount of hand labor — articles in which machine methods play little or no part. So far as the

country itself lacks the raw material for a given class of manufactured goods, it usually imports this material in crude form or, at most, in semi-manufactured form and works it up within its own borders.

Aside from mere minor variations of color, shape, and size, scores of thousands of distinct kinds of wares are produced by American factories. Of these articles a great part are turned out in large numbers of units. Many things that in most countries are found only in the homes of the few are the heritage of the majority in the United States. Articles which because of the limited demand are elsewhere usually made by hand, perhaps to individual order, are made in factories and by thousands. The multiplicity of American industrial output is in some measure suggested by the list of industries distinguished in the statistical returns, of which the number runs up to three hundred or more. Almost every "industry," moreover, turns out several or many distinct types of goods. To say nothing of such catchalls as "Fancy and miscellaneous articles not elsewhere specified," many of the more definite headings, such as "Agricultural implements," "Jewelry," or "Toys and games," cover hundreds or thousands of types.

The Interrelation of Industries

Few finished articles of manufacture have a simple pedigree. To most of them not a single factory but a group of factories have contributed. Intricate ties bind different manufacturing industries together. There is no factory but uses some materials already worked upon by other factories; many use such partly fabricated materials exclusively. A single plant may draw the constituents for its output from a score or more of distinct factory industries. Conversely, many factories produce nothing which goes directly to final consumers: their entire output is destined for further elaboration by other plants. To be sure, industrial concerns often spread out the scope of their operations, themselves pro-

ducing more of the materials that enter into their finished wares. This tendency toward "integration," or "vertical combination," however, scarcely more than keeps pace with that multiplication of ties between separate concerns and industries which results from the constantly increasing elaboration of commodities.

Consider the automobile factory. Ordinarily it takes none of its material direct from mine or farm or forest. It seeks instead the aid of other factories. It calls on the sawmills, the steel-works, the smelters and refineries and rolling mills handling other metals, the tanneries, the textile mills, the glass factories and paint works, the plants making nails and screws and bolts and hardware of various patterns, and on still others for minor contributions. The motor-car factory usually does not stop with buying these less advanced manufactured materials. It seeks outside its walls parts and accessories which are themselves complex products and into which, in turn, have already entered partly manufactured materials from numerous sources. It sends to Akron for tires, a highly elaborated product. It very likely buys from other concerns electrical generators and other electrical devices, batteries, speedometers, headlights, clocks. The automobile-maker may even go much farther and rely upon outside factories to furnish entire bodies or entire engines. The Bureau of the Census distinguishes the motor-car industry proper from that of making bodies and parts for motor cars, and the latter is the larger of the two in point of number of wage-earners.

This is perhaps an extreme illustration of the interrelations of factories, but the difference is only in degree. Everywhere manufacturing industry is tied together. Factories as a group sell to one another more than half as much as they sell to the general public. In many industries the salesman's eloquence must be directed to the factory manager rather than to the merchant or the consumer. This intimate relation of industries as purveyors to one another has a very important influence on business conditions, quite apart from

the influence which the buying power of the workers in each industry exerts upon the demand for the products of the other. Prosperity or depression in a given branch is reflected over a wide area. As a counter influence against depression, however, stands the fact that many an industry has numerous outlets for its products. It sells not to one class of other factories but to several classes. Taking it all together the close and ever closer interdependence of industries tends apparently to stabilize business rather than to make its equilibrium more delicate.

Measuring Sticks for Factory Industries

Before proceeding to the discussion of the several groups of manufacturing industries and of the major individual branches, a few landmarks must be set up by which to chart the course. The field is not so simple as that of agriculture or of mining.

In the first place, there are several quite distinct measuring sticks as to the relative importance of industries, and the appropriate stick depends on the purpose in view. These measuring sticks include (1) those having to do with output, namely, the gross value of the product, the gross value excluding duplication within the field under consideration, and the value added to materials by manufacturing processes; (2) those having to do with agencies of production, namely, the number of persons employed, the capital invested, and the mechanical horsepower utilized. How are these related to one another?

The factory differs from the farm or the mine in that it can do nothing of itself. It transforms something from the outside. What it turns out is only in part its creation. To judge the contribution of manufacturing industry as a whole or of any part of it to the wealth of the nation, we must obviously exclude the value of materials. In this connection a distinction is sometimes made between constituent materials and auxiliary materials. The former are what is

transformed: they become part of the product; the latter, the most important of which are fuel and power, serve merely as aids to the process. In the practice of the United States Census Bureau, as has already been stated, the cost of fuel and electric current is deducted, along with that of constituent materials, to give the net value created by factories. Were this not done, the ranking of some of the individual industries would be considerably altered.

While "value added to materials" is the most significant of all our measuring sticks, there is much interest, from the point of view of the character of national consumption, in the value of the products of a given industry or group of industries, including that of the materials used. To be of much use, however, such a total must exclude such duplication of values as may arise where other factories of the same industry or the same group have already contributed part of the value of those materials. In many cases totals without such adjustment are wholly meaningless in themselves, and are useful only for comparison with another period of time on the assumption that the proportion of duplication has not changed enough to vitiate conclusions. An estimate of the combined value of all manufactured products taken together, with duplication eliminated, has recently been published by the Department of Commerce, with due reserve as to its accuracy; the total has been stated in a preceding paragraph. As yet no one has attempted to make similar calculations—a still more difficult matter—for the fifteen great groups of manufacturing industries. In this chapter the writer has made rough approximations as to the amount of "internal" duplication in certain individual industries. There are, of course, many industries in which duplication is a matter of minor magnitude, and the importance of such industries from the standpoint of consumption may be judged directly from the reported value of product.

Industries differ immensely in the extent to which they enhance the value of the materials they handle. Cash registers, accounting and calculating machines, as a group,

are worth some nine times as much as the materials used in them; on the other hand, in the butter industry the value of the finished product is less than one sixth greater than the value of the cream and other constituent materials. The ranking of an industry from the standpoint of the value it itself creates is often utterly different from that based on what the public pays for the wares upon which it has put the final touch.

On the other hand, most industries occupy roughly the same position in the scale of importance whether they are judged by the value they add to materials or by the number of their employees. This follows naturally from the fact that wages and salaries usually constitute a very large fraction of the value created. There are, however, some rather wide differences among industries in the relation between the amount of capital used and the number of workers, as well as differences in the rate of return secured on that capital. These differences, together with variations in the rates of wages themselves, cause a certain number of sharp disparities between the ranking of industries according to number of persons engaged and the ranking according to value added to materials by manufacture.

From what has just been said it is apparent that data regarding the value of capital invested in the several manufacturing industries would aid greatly in judging their economic importance. The difficulties of obtaining and interpreting statistics of capital are so serious, however, that the Federal Census Bureau has dropped the inquiry from its manufactures schedule. One of the forms that capital takes is power-generating or power-transforming equipment: engines, water wheels, and electric motors. Some industries use many times more power equipment per human worker than others. However, it is impossible to reach any significant relation between the amount of horsepower of different industries and the total amount of capital invested in them or the value they create. Big machines requiring great power may cost no more, and add no more to the output, than

small and intricate machines that need little force to actuate them. From the economic standpoint statistics of horse-power are chiefly useful in comparisons of the same industry at different times or in different sections or countries.

The Problem of Classification

In addition to the problem of the measuring stick, manufactures statistics present another of much difficulty — that of classifying, of drawing proper lines between industries and groups. Minute subdivisions are impossible because there are many overlappings. A single factory often makes several or many distinct classes of products. Some of the industries listed in census returns are really groups of industries and therefore not fairly comparable with others which represent substantially a single kind of wares. The "foundry and machine-shop industry" is a conspicuous illustration of such a catchall. Often, as business becomes larger, statistical authorities break into two or more parts the field formerly treated as one. Conversely, changes in the actual practices of factories, extending their operations over a wider scope, may make it unavoidable to combine industries formerly segregated. Again, variations in the way in which business is conducted in different countries may virtually compel such differences in classification as to render international comparisons for this or that industry of little significance.

The throwing of industries together into large groups is by the nature of things a matter of more or less arbitrary judgment. The number of groups may be varied almost at will. For instance, the cloth-making industries may or may not be grouped with the clothing industries and others using cloth as materials. Obviously when we speak of one group of industries as being more important than another, the relative comprehensiveness of the two must be taken into consideration. The multiplicity of industries is such that grouping is essential for condensed analysis, but it inevitably blurs the picture.

SECTION 2. GROUPS OF INDUSTRIES

In any summary description of American manufacturing industries only the high lights can be shown — the position of the great groups of industries and of the major individual branches. Even from such a broad view, however, it is possible to discern clearly three conspicuous characteristics: (1) the large output of what may for convenience be called capital goods, (2) the large output of luxuries and semi-luxuries, and (3) the high elaboration to which materials are in many cases subjected. The third characteristic follows from the two first named, since by their very nature advanced forms of capital as well as articles of a more or less luxurious character usually require a high degree of elaboration.

When an industry is spoken of as making capital goods or luxury goods, these terms must necessarily be used in a rather rough sense. The statistics do not lend themselves to fine distinctions. A single factory may make both capital and noncapital goods or both luxury goods and goods of less costly type. The same product may under different circumstances serve altogether different uses. Thus steel may enter into new productive equipment, or may serve to repair existing productive equipment, or may enter into goods which serve not for producing other goods but as a more or less permanent source of enjoyment. We have already noted that concepts of what constitutes capital differ (see Chapter V, Section 3). The conception of a "luxury" is unavoidably vague; what appears a necessity in one country or to one person seems to another far from essential. For convenience we shall call any industry which produces primarily articles of an enduring character a capital-goods industry, and we shall treat as a luxury industry any industry the larger part of whose output is such as only people of high standards of living can afford to buy. The automobile, for example, is from this point of view both an article of capital and an article of luxury.

The great groups into which the Census Bureau throws the manufacturing industries are based in part on the nature of the materials and in part on the uses which the products serve. Figs. 69 and 70 show the relative importance of these groups both in the number of persons (wage-earners and salaried employees) engaged and in the value added to materials. The data relate to 1927 save for the substitution of 1925 data for the group of transportation equipment. On account of the remodeling of the Ford cars the figures of the automobile industry for 1927 were abnormally low.

Not far from half the energy of American factories goes into articles which possess in greater or less degree the character of capital — articles made from durable materials (see Fig. 69). Prod-

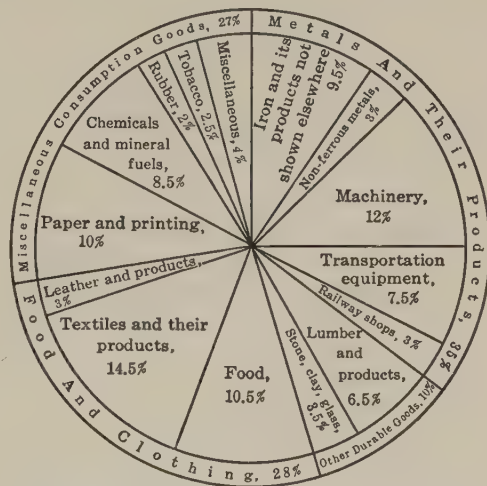


FIG. 69. Diagram showing the relative importance of the great groups of manufacturing industries

This diagram shows the percentage distribution of the total value added to materials by the process of manufacture among the several great groups of industries. As regards the relative comprehensiveness of the groups see Section 1 of the text. The data relate to 1927 except for the transportation group, as explained in the text

ucts consisting chiefly of metals account for 35 per cent of the total value created by manufacture, and those of wood, stone, clay, and glass make up another large slice. The immensely important part played by iron in the national economy stands out sharply. It is safe to say that in no other country is so large a proportion of industry devoted to making things which either add to the permanent wealth of the nation or serve to maintain existing capital equipment.

The production of machinery alone (not counting the great volume of semimanufactured materials used in it) represents 12 per cent of the activity of American factories, a proportion exceeded only by the textile group. The large place occupied by the group of transportation equipment is chiefly due to the ubiquitous automobile. The group "iron and its products" includes not only the basic iron-and-steel industry but also elaborative industries which make an endless variety of articles ranging all the way from giant fire-and-burglar-proof safes to fly-swatters, from bathtubs to tacks; these iron-using industries are so specialized that none of them appears among the major individual industries shown in subsequent diagrams, but in the aggregate they are of great magnitude.

Among the industries that deal with the more perishable materials, textiles and their products occupy the leading position in respect to the value added to materials by manufacturing processes. Clothing is a big item in the budget of any people. In the United States, with the demand for many and often elaborate garments that goes with high income, the value added by manufacture in the textile industries is large in proportion to that of the raw materials used. The manufacturing of cloth, of clothing, and of other textile products therefore represents one seventh of the total value created by all American factories. Food manufactures take a lower rank, though they account for over one tenth of the aggregate "value added." As has been stated, food factories are exceptional in the relatively low cost of the processes of transformation as compared with the cost of the materials. The value of manufactured foodstuffs, including materials, is over one fourth the total value of American manufactured goods (excluding duplication of values).

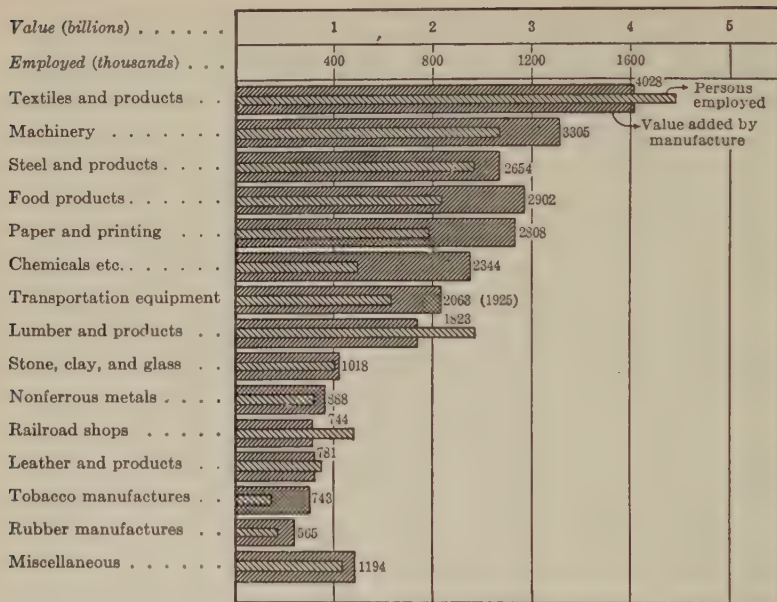
The liberal, not to say extravagant, use of the printed page is one of the striking characteristics of American consumption (see Chapter I, Section 3). Paper and printing (the big item is printing) demand one tenth of the total effort of manufacturing industry, a proportion not even approached in any other important industrial country.

The group of "chemicals" is extremely heterogeneous, and includes many products scarcely suggested to most persons by the word. As a matter of fact, however, the importance of chemistry in modern industry is even greater than appears from the statistical classification. Chemical processes play a large part in many factories which are grouped under other heads. This is true, for instance, in all industries which extract metals from ores or which combine metals into alloys, in the textile industries, in the manufacture of leather, paper, and rubber, and even in the production of foods—for example, cooking, cheese-making and the raising of bread are all chemical processes. Of the industries classified by the census as dealing with "chemicals and related products," three of the most important have to do with fuels—the refining of petroleum, the manufacturing of coke, and the making of gas (illuminating and heating). These together account for about one third of the group.

In Fig. 69 the areas which represent leather and its products, rubber manufactures, and tobacco are relatively narrow, but each of them represents some hundreds of millions of dollars of value added to materials. The miscellaneous group comprises scores of industries, turning out many thousands of classes of goods of widely differing character.

In Fig. 70 the groups of industries are arranged in the approximate order of the magnitude of the value which they add to the materials used. The textile group stands at the top, but the products made wholly or principally of iron would far outrank textiles were they treated as a single group instead of being broken up into three. The diagram shows also the number of persons engaged in each group, including proprietors, salaried workers, and wage-earners. In this respect the ranking of groups is somewhat different from the ranking according to value. The chemical group has few employees compared with the value produced, a fact due chiefly to exceptionally large capital investment and the use of highly automatic processes, especially in the mineral-fuel industries. The lumber group, under the influence of

A. VALUE ADDED BY MANUFACTURE AND NUMBER OF EMPLOYEES



B. HORSEPOWER OF PRIME MOVERS, IN MILLIONS

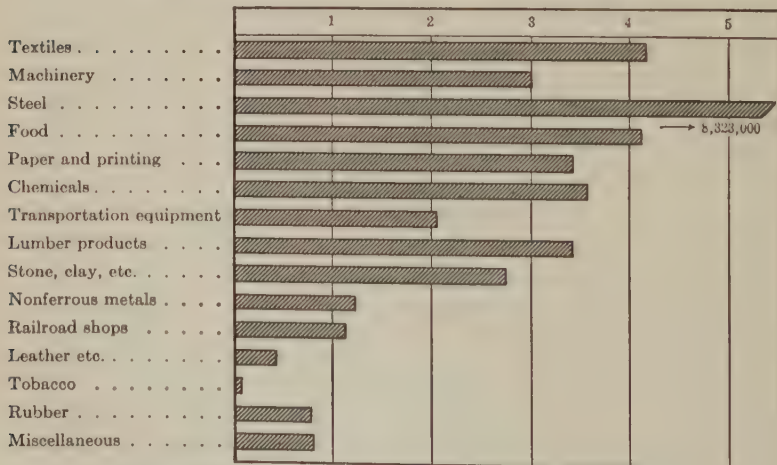


FIG. 70. Diagram showing the groups of manufacturing industries, 1927

In section A the inserted figures represent the value added to materials in millions of dollars. The data for the transportation-equipment group relate to 1925, the year 1927 being abnormal

the sawmill industry, presents precisely the opposite picture: the cutting, hauling, and rafting of logs (most of which work is included with sawmilling proper) require only simple equipment but much labor. The exceptionally high ratio of employees to value in the railroad shops is explained by the fact that these shops do not produce for sale at a profit, but work at cost for the railways which own them, in some cases even without including interest on the plant in their charges. The tobacco industry is wholly abnormal because special and large government taxes on the products are included in the value reported.

SECTION 3. MAJOR INDIVIDUAL INDUSTRIES

Figs. 71 and 72 present data for the nineteen largest industries as determined by the value added to materials by manufacture.¹ Each of them contributes a value of more than \$250,000,000 yearly. In addition to the industries listed, there are thirty-five or forty others in the United States with "value added" of more than \$100,000,000. In considering the relative ranking of individual manufacturing industries it should not be forgotten that much depends on the degree of comprehensiveness of the respective census classifications.

Fig. 71 shows the value added by manufactures and the number of employees in each industry. From the standpoint of the ranking of industries as such this diagram is the more significant. Fig. 72 shows the total value of the products turned out, including that of the materials used, but, in cases where it is an important factor, deducting duplication of materials within the industry (a deduction involving estimates of an approximate character). The amount paid as salaries and wages is also indicated.

There are five individual manufacturing industries in the United States each of which annually adds to the materials

¹ Railroad repair shops, shown in Fig. 70, are omitted from Figs. 71 and 72 as being scarcely comparable with other industries.

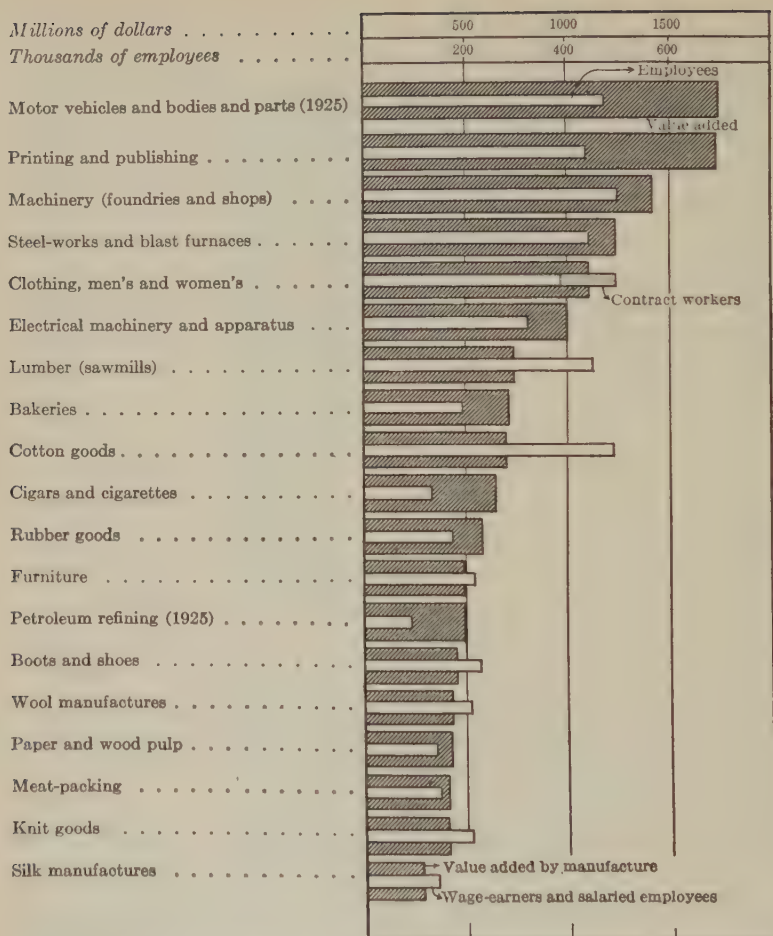


FIG. 71. Diagram showing the major individual manufacturing industries: value added to materials and number of employees

The ranking of the industries depends somewhat on their relative comprehensiveness (see text, Section 1). The data relate to 1927, except that 1925 data are used for the motor-vehicle and petroleum industries, as being more normal. In the case of the printing, clothing, and silk industries the amounts paid to other establishments in the same industry for contract work have been deducted. In the clothing industry large sums are also paid under contract to persons who work in their own homes. Such persons are in much the same position as wage-earners in the factory, and their estimated number has been added (separately indicated) to the number of employees. The narrow bar represents the number of wage-earners and salaried employees according to the lower scale; the broad bar, the value added to materials by manufacture. See also notes under Fig. 72

MILLIONS OF DOLLARS

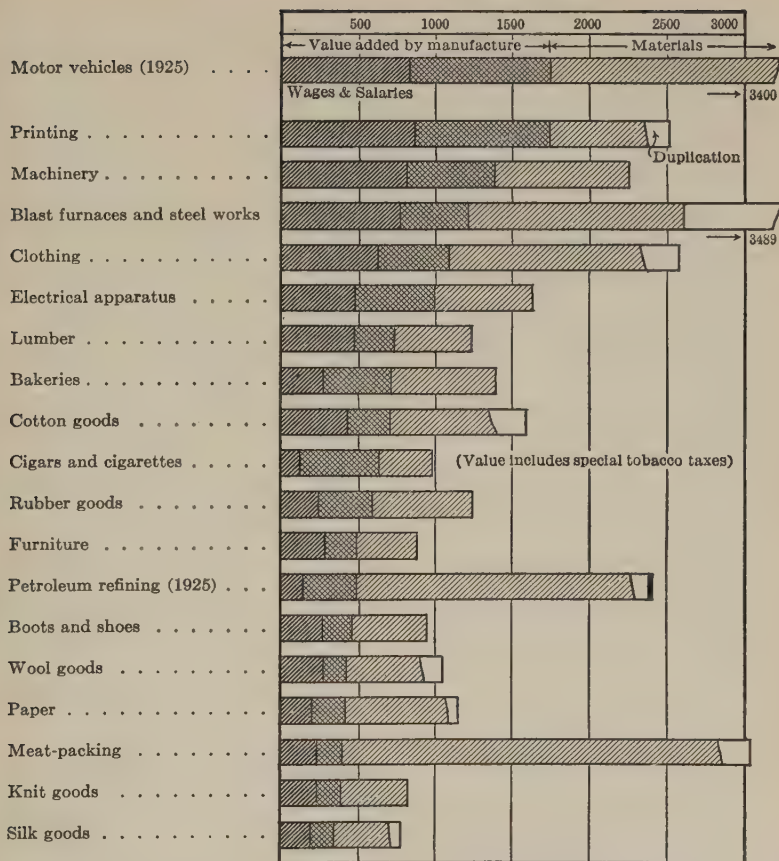


FIG. 72. Diagram showing the major individual manufacturing industries: value of products, cost of materials, and wages and salaries (1927)

The cost of materials of certain industries is subdivided by an irregular line (indicating the approximate character of the figure) into that furnished by other factories in the same industry (representing duplication of value) and that from other sources, including raw materials and those obtained from other manufacturing industries. The net value of the goods sold to the public is thus shown approximately. For other industries shown there is little such duplication. The industries "motor vehicles" and "motor-vehicle bodies and parts" are treated as one, since most of the product of the latter goes as material to the former. The value given is the total for "motor vehicles" plus \$200,000,000, estimated as the value of goods sold by the "bodies and parts" industry to the public. The gross value of the products of steelworks is \$2,946,000,000, and of blast furnaces \$765,000,000; but most of the product of the latter goes to the former, and there is also considerable duplication within the steel branch itself. See also notes under Fig. 71

used a value of more than a billion dollars, and puts forth goods worth, including the materials, more than two billions, thus surpassing in magnitude the total factory output of most countries of the world. Besides these, ten others have a total value of output, counting materials, of more than a billion. One of these ten is the flour-milling industry, which does not appear in Fig. 72 because of its relatively low rank in value created by the manufacturing process itself.

The automobile industry, the youngest of these major branches, has forged ahead of all others both in total value of products and in value added by manufacture, an evidence both of the energy of its leaders and of the high buying power of the American consuming public. In value added to materials the motor-vehicle industry is approximately equaled by that of printing and publishing, the position of which is an altogether remarkable thing in the economic life of the United States. Printing is perhaps more widespread over the earth than any other factory industry except grain-milling, but most countries do not afford newspapers and magazines of huge bulk and fabulous circulation nor best sellers by hundreds of thousands of copies. The two American industries which top the list are in a large measure of the luxury type.

And the two which follow close on the heels of these are industries which produce primarily capital goods — goods which serve to build up and maintain the productive equipment of the nation. These are the "foundry and machine-shop" industry and the heavy iron and steel industry. For convenience the first is often called the machinery industry, but it by no means comprises all production of machinery: its scope is much narrower than that of the machinery group shown in Fig. 70. The "iron and steel" industry as here shown comprises blast furnaces and rolling mills but not the numerous branches which elaborate the products of the steel-works.

Only in the fifth place among the industries appears one (that of clothing) which turns out articles not chiefly of the

nature of capital or of luxury goods, though even here a very considerable proportion of the product is of costly character. In the sixth and seventh positions appear again industries (electrical apparatus and lumber) which are for the most part builders of capital. Indeed, of the nineteen branches with the greatest value added to materials five are concerned very largely with making and maintaining permanent equipment, and as many more produce largely goods that may be classed as luxuries or semi-luxuries. These latter include, besides the motor-vehicle and printing industries, the manufacture of rubber goods, petroleum products, silk goods, and cigars and cigarettes.

In several instances the rank of industries in total value of products, including materials, is quite different from that in value added by the factories themselves. A number of the major raw materials require only relatively simple transformation to prepare them for use. The meat-packing industry, ranking seventeenth in value added by manufacture, holds second place as to total value of products (excluding duplication in the iron-and-steel industry). The petroleum refineries also stand much higher in total output than in the value which they themselves create.

Certain industries not covered by Figs. 71 and 72 may be briefly mentioned. Important in the food group are the manufacturing of flour, of butter, of canned and dried fruits and vegetables, and of confectionery and ice cream, as well as the refining of sugar. Millinery and lace goods, shirts, and men's furnishings are important items in the textile group.

Among the many advanced commodities of iron and steel which are classed under distinct industries are cast-iron pipe, structural and ornamental ironwork, hardware, stoves and furnaces, steam and hot-water heating apparatus, tinware (so called, being made of tinned steel sheets), tools, and cutlery. None of the separate branches of the "nonferrous metals" group ranks among the nineteen biggest industries of the country. The basic activity in this field is smelting and refining, especially of copper, lead, and zinc; in this

industry the "value added" is much less than the cost of the ore and other materials. The making of alloys, especially brass and bronze, is another important branch. Of the more advanced products of this group may be mentioned aluminum utensils and other articles, stamped and enameled utensils and other wares, gas and electric fixtures and lamps, clocks and watches, jewelry, and silverware and plated ware. Many of these articles are of a luxury type, and some of a capital-goods type; moreover, much of the nonferrous metals turned out by the smelters enters into machinery, automobiles, and other forms of capital.

Important classes of machinery not covered by the diagrams are agricultural implements, cash registers and calculating machines, typewriters, metal-working and textile machinery, sewing machines, and washing machines. The transportation-equipment group includes, besides motor vehicles, the important car-building, shipbuilding, and locomotive industries.

In the group of industries using wood as material, the most important after the sawmills themselves and the furniture factories are the planing mills and the plants which turn out cooperage and packing boxes.

The tanning of leather, the basic industry in the group of which the boot-and-shoe industry is the largest branch, does not itself rank among the great industries from the standpoint of number of workers or the value added to the materials.

Apart from the three industries making mineral fuels, already alluded to, the chemical group includes a number of branches of considerable magnitude. There is the "chemical industry" in the narrow sense, and the manufacturing of drugs and medicines. Other important products forming the basis of separate branches are explosives, candles, fertilizers, paints, animal and vegetable oils, soap, perfumes and toilet preparations, ink, and liquors — the last no longer important, in the official statistics!

Some of the principal industries of the "miscellaneous" group are those making musical instruments and phono-

graphs, photographic apparatus and supplies, fur goods, signs and advertising novelties, sporting and athletic goods, and toys and games. These, as well as many other products falling in this group, partake largely of the character of luxuries. Paving materials and roofing materials — capital goods — are also important products. Still other items running into many millions of dollars each are brushes, buttons, professional and scientific instruments, mattresses and bed springs, optical goods, miscellaneous stationery supplies, and surgical appliances. This group also includes motion-picture films, but the statistics of the manufacturing aspects of the "movies" cannot give any adequate idea of the wide ramification and huge financial magnitude of this most modern of economic activities.

SECTION 4. GROWTH OF MANUFACTURES SINCE 1900

Throughout the history of the United States there has been a rapid expansion in factory industry. At practically all times output of manufactured goods has outrun population. Until recently the number of persons engaged in manufactures has likewise increased faster than the total number of inhabitants, a relative shift having taken place from agriculture, the producer of basic foodstuffs and raw materials, to the elaborative industries. Since the World War the number actually employed in factories has declined, but the increase of production has continued unabated, a marked gain in output per worker being manifest. The expansion of manufactures has already been traced in general outline in Chapter II. It is worth while to add some further detail to the picture of the progress in this field since the turn of the century.

Between 1899 (the decennial census of manufactures) and 1927 the number of workers in American factories increased by about 90 per cent as compared with an addition of about 59 per cent to the total population of the country (see Fig. 73). Wage-earners increased much less than salaried

employees, about 77 per cent being added to their number, whereas the salaried employees multiplied three and one-half times. On account of the greater use of capital, the progress of science, and the advance in the efficiency of labor and management, the output of the factories increased far more than the number of workers. One indication of the greater use of capital is found in the fact that the capacity of the prime movers by which mechanical power in factories is applied multiplied fourfold between 1899 and 1927.

The value added to materials by factory processes rose from less than five billions at the beginning of the century to twenty seven and a half billions in 1927, or by more than 470 per cent. It may be noted that the increase in the money cost of materials during this period was very nearly the same as the increase in the value added to materials by processes of manufacture, with the consequence that the total value of factory products (including materials) also shows substantially the same gain.¹

Part of this immense increase, however, was due to higher prices and higher wages. The general index of wholesale prices (see last bar in Fig. 73) was about 80 per cent higher in 1927 than in 1899. However, the factory output, independent of variations in price, nearly trebled during the period, the percentage of increase being about 180.² Comparing this estimate with the increase in the number of workers — including salaried employees as well as wage-earners — it appears that the average output per man was about 50 per cent greater in 1927 than at the close of the last century.

Although in practically every individual manufacturing industry and in every great group of industries there has been marked expansion during recent decades, conspicuous and

¹ This statement holds, at least roughly, whether or not one excludes the duplication due to the use of partly finished products of one factory as materials for another. The method of eliminating such duplication can be only approximate.

² For further discussion of the method of arriving at this estimate see Chapter II, Section 5.

RELATIVE NUMBERS FOR 1914 AND 1927 ON BASE 1899 AS 100

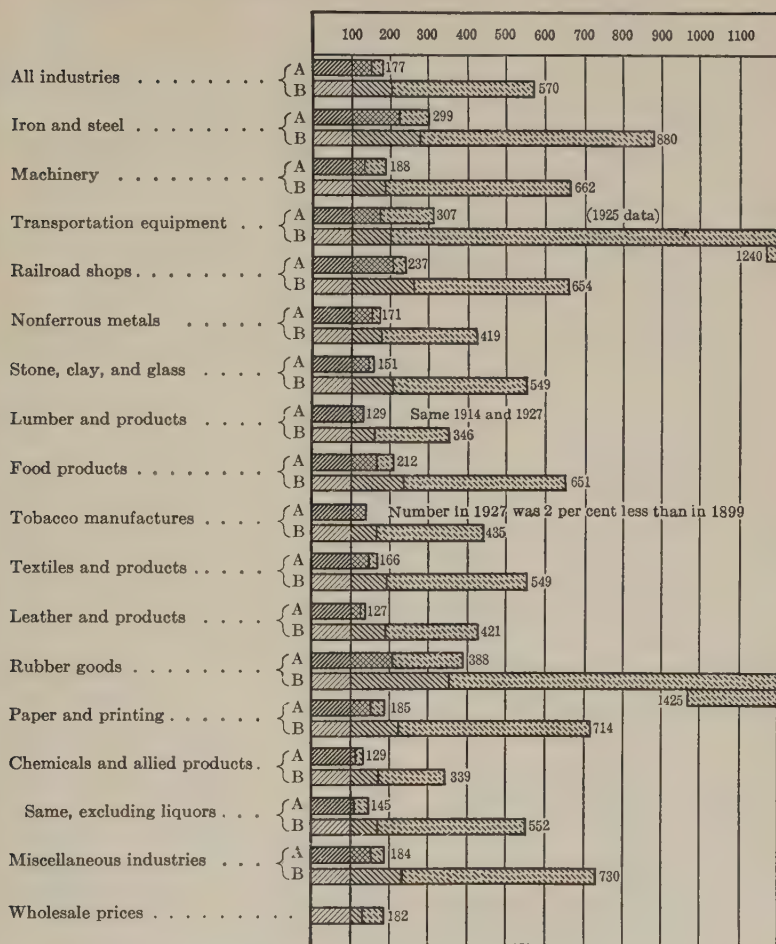


FIG. 73. Diagram showing the growth of the groups of industries

For each group each bar affords a comparison between 1899, 1914, and 1927. The first bar (A) relates to wage-earners, and the second (B) to value. The bars show relative numbers as compared with 1899 taken as 100, the end of the second section representing 1914 and the full length of the bar (except as stated) representing 1927. The increase in value is in part due to higher prices, roughly indicated by the wholesale-price index shown at the bottom. The prohibition of the sale of intoxicating liquors has greatly affected the totals for the chemical group, and figures exclusive of the liquor industries are therefore shown. For transportation equipment 1925 is shown instead of 1927, which was an abnormally low year, much surpassed both in 1926 and 1928

significant differences appear as to the rate of growth. Broadly speaking, those have expanded the most which either create capital goods for further aid in production or supply more advanced commodities — commodities partaking of the character of luxuries, semi-luxuries, and conveniences. For the same reason that the growth of manufactures has been more rapid than that of agriculture, so also have those manufacturing industries which contribute to high standards of living expanded more than those which supply more necessary articles.

Fig. 73 shows the increase since 1899 in the number of workers and the value added to materials by each of the fifteen major groups of industries. The data for value greatly exaggerate the increase in physical output in most branches by reason of the rise in prices. There have, however, been wide differences between commodities in the matter of price changes; some (for example, motor cars) are actually cheaper at present than they were twenty-five or fifteen years ago. Approximate calculations of quantitative changes in output show that in all the groups the increase in production has been very much greater than the addition to the number of employees.

It will be seen that the groups showing the greatest increase in wage-earners since 1899 are those of iron and steel and their products, transportation equipment, and rubber goods, in each of which the number has trebled or more than trebled. The iron-and-steel and transportation-equipment groups are concerned with capital goods, and those produced by the transportation-equipment group are at the same time chiefly of a semi-luxury character. The rubber group is directly tied up with the motor car. These three groups also lead all others with respect to the increase in value added to the materials by the processes of manufacture. Moreover, on account of the extraordinary advance in the efficiency of production in the transportation-equipment and rubber-goods groups the quantitative gain in output has been even greater than the gain in value.

Other groups showing increases in the number of wage-earners higher than the average include those of machinery, paper and printing, food products, and miscellaneous industries, together with the railroad repair shops. In these five groups the number of wage-earners in 1927 ranged from 85 to 140 per cent larger than in 1899. In the case of the food-products group the large increase is somewhat misleading, being due in considerable part to the transfer of food manufacture from small shops, farms, and homes to factories. Of these five groups two have to do with capital equipment, and two others, paper and printing and the miscellaneous group, with products which for the most part appeal to advanced wants.

In contrast with these stands the relatively slow increase in the number of workers in the group of lumber and its products, and in that of leather and its products. The slow pace in the lumber group is largely the result of the substitution of more durable materials for lumber in construction work. Although the leather industries produce higher and higher grades of goods, they have chiefly to do with things the demand for which naturally expands little faster than the population. Moreover, the greatly increased practice of riding in automobiles has somewhat reduced the wear and tear on shoes.

The increase in the number of workers in the chemical group appears much greater when the liquor industries, which have practically disappeared by virtue of the Eighteenth Amendment, are excluded. The fact that even thus the number added is relatively less than the average for all industries is largely the result of the great gain in efficiency in production in some of the major industries of the group, such as petroleum-refining and the manufacture of coke and artificial gas. The only one of the fifteen groups in which there has been no increase in wage-earners since 1899 is that of tobacco manufactures, which employed a decidedly smaller number in 1927 than in 1914. The explanation is found partly in the relative decline in the consumption of

cigars, the manufacture of which requires much hand labor, and partly in the introduction of highly automatic machinery for making cigarettes.

SECTION 5. CAUSES AFFECTING THE LOCATION OF FACTORY INDUSTRIES

As was shown in Chapter VII, the geographic distribution of manufacturing industries is very different from that of either agriculture or mining. Factories are very strongly concentrated in the northeastern part of the country — east of the Mississippi River and north of the Potomac and the Ohio. What are the reasons for this concentration?

The causes that determine the location of factory production are more complex than those affecting the farm or the mine. The miner must go where nature has placed what he seeks, often in narrowly limited areas; on the other hand, agriculture must by the nature of its processes occupy large surfaces. Since there are hundreds of thousands of square miles in the United States capable of producing the principal farm products, the relative cost of transportation becomes a major influence in determining where these shall be produced. The manufacturer has in some respects more freedom to choose his site than the miner or the farmer, but at the same time he is subject to certain pressures that scarcely touch miners and farmers.

There are a few manufacturing industries which for special reasons are very widely distributed. Every state, almost every community, has its gristmills and its slaughterhouses handling local farm products, though the great consuming markets draw their supplies chiefly from big plants in a few centers. Again, common clay is found pretty much everywhere, and, since brick is a commodity of such low unit value that transportation adds heavily to cost, most communities make their own supplies of this essential building material. Save in the prairie regions sawmills are found very generally; but with the depletion of the forests these

have in most sections become small local affairs, the big consuming centers now relying largely on lumber from distant Gulf and Pacific-coast sources. Certain other industries owe their widespread distribution not to localized supplies of materials or heavy cost of transportation, but to the perishable character of the product. Almost every town has bakeries and factories for confectionery and ice cream. Furthermore, the necessity for immediate contact with the consumer dictates that planing mills and foundries and other shops for handling local job work in wood and metals shall be found everywhere. Similarly, each town must have its printing shops; in spite of the use of "boiler plate" and "patent insides" the local news must be printed at home, and there is local "job work" of varied character besides.

Most manufacturing industries, however, show a decided concentration. A few states account for all the plants or nearly all. Strong forces pull the factory to one location or another.

These forces fall into two main groups: those which have to do primarily with cost of transportation and those which do not. Factors of the first group are naturally much more important in "heavy" industries than in "light." Without making fine distinctions, the heavy industry may be defined as one in which the value of the materials used or of the products, or of both, is relatively low per unit; that is, low in proportion to weight or bulk. Light industries are those of relatively high unit values. Heavy industries usually employ chiefly crude materials, directly from mine, forest, or farm; light industries more often use materials that have already been partly fabricated in plants of the heavy type. Most of the heavy industries are "basic" in the sense that they are essential contributors of materials to more advanced manufactures, whereas only a few of the lighter branches can be considered as such.

It is a notable feature of American manufactures that light industries employ many more workers and turn out a much larger value than those of the heavy type. This follows

from the fact that luxury and semi-luxury goods and highly elaborated capital goods play so great a part. Consequently a large proportion of American factories are relatively little influenced, as regards location, by causes that have to do with cost of transportation. There are, to be sure, a good many industries more or less intermediate in type between heavy and light; for example, those making the more massive forms of machinery. Circumstances affecting transportation exert considerable pressure in the location of these.

Factors affecting Cost of Transportation

The conditions that chiefly determine cost of transportation in manufacturing industry are, of course, the geographic situation of sources of materials and the situation of markets for the finished products. Power is essentially similar, from this standpoint, to constituent materials. In industries requiring great use of mechanical power its source may be a dominant factor in determining location. Coal is a bulky commodity. Before the day of the steam engine, factories were mostly tied to water-power sites. Water power is today a big factor in certain regions, but electric transmission has freed the manufacturing plant from the necessity of hugging the primary source of energy. However, the limits of transmission are such that factories which employ water power must remain within reasonable distance of its origin. Again, where, as is increasingly the case, factories use electric current generated by fuel, the source of that fuel has an important influence in determining the general region in which industries requiring much power shall find their seat.

He who engages in a heavy industry must consider the geography of materials and markets carefully. He may be using two or more bulky materials of different origin; the relative costs of moving the one to the other or moving both to this or that other point must be compared. If his materials are of low unit value and his products of much higher value;

better able to stand the cost of transport, he will have another problem from that which confronts him where materials and products both are of low value. He bears in mind, however, that railways charge much more per ton for moving elaborate manufactures than for moving cheap raw materials, a practice justified by the principle of "what the traffic will bear" as well as on other grounds. It may save more in freight to be near markets than to be near sources of materials. Some typical illustrations of the influence of the location of the sources of materials and that of markets upon the geographic distribution of heavy manufacturing industries may be mentioned.

Deposits of metallic ores are found in limited areas; mainly, especially in the United States, far from principal markets. In most cases the ores contain but a small proportion of metal, and to transport them for long distances would cost far more than to ship the extracted metals; smelting is therefore usually performed close to the mines (unless processes of ore concentration can advantageously be applied), even though in some cases the cost of bringing fuel to the smelter is high. Iron ore is an exception. The causes determining the location of blast furnaces and steel-works — the cheapness of water transport of ore by the Great Lakes is one of the most important — are more fully discussed in Chapter IX. Petroleum, like ores, is of decidedly localized origin, but it is so easily transported by pipe line that the refineries very generally seek centers of large population or of convenient rail and water distribution for the finished products.

An industry closely tied to its materials is that of the saw-mill. The waste of long hauls of logs containing a large proportion of practically useless material is obvious. Logs may be moved considerable distances in rafts, but they will go no farther by other methods of carriage than is strictly necessary. Pulp and paper mills also tend to cling to the forest, though even more essential to them is an adequate supply of water both for power and for process purposes.

Other Factors in Location

Apart from costs of transportation, the most important factors in determining where factories shall be situated are the availability of labor, the personal preference of workers and managers, tradition, and the sheer accident of the "first start." Factors of this sort work most strongly in the case of the lighter industries, which are not tied down by the sources of their materials or the situation of markets. They tend to work cumulatively in building up already existing industrial centers and to limit the geographic expansion of manufactures to areas close to such centers. A distant section or town must offer some very special inducement to bid factories away.

Particularly important is the matter of labor supply. It is not easy to turn workers quickly from the farm to the factory. Still harder is it to induce a body of factory workers to leave their homes and move, bag and baggage, to some other town, to say nothing of a far-off state. The owner finds it simpler to place a new plant close to others and to hire labor in the existing market. This tendency is even stronger where he needs labor skilled in some particular field. Thus we come to have cotton towns, shoe towns, glove towns, metal-working towns. To be sure, wages in established industrial centers tend to become high, both because costs of living are high in large cities and because specialized workers in a given center often acquire a certain measure of monopoly power. In some cases the employer is driven to seek a widely distant location where wage levels are lower, even though he has to put up, at least for the time, with less competent labor.

The employer himself, like the worker, usually prefers to stay where he has been accustomed to live. Owners and managers of new plants are often relatives of persons operating existing plants, or men trained in those plants. Naturally they are disposed to remain at home or, if they go elsewhere, to seek some place where conditions of life are closely similar ;

that is, some place not far away. Indeed, even apart from actual preference or from any definite economic cause, the tradition often becomes strongly fixed that the given town or section is the proper place for the given industry.

In earlier days, before the influences of which we have been speaking had had time to develop, factories in the lighter industries grew up more or less at random. Here and there an individual of exceptional capacity made an exceptional success. His plant became big; it built a town, and the town gradually drew to itself other, similar factories or unrelated industries. Such personal and more or less accidental explanations of the location of industries still appear occasionally, but other factors have so grown in strength as usually to predominate.

The fact that the United States was first settled in the East gave the Eastern states an advantage in manufacturing industry that continues to this day. Factories started where the people were. As years went by, many must needs seek farm lands farther west to feed the growing population, but there was no such pressure for factory owners or factory workers to migrate. The constant stream of immigrants, except so far as they went on farms, found it cheaper to stay near the seaboard, thereby avoiding expensive travel. The Eastern cities, moreover, offered them the attraction of colonies of their own nationality. The shutting of the gates against immigration is likely to facilitate considerably the spread of factories toward the West and the South. The tendency of manufacturing industry to concentrate in large cities is more fully discussed in Chapter VI, Section 5.

The metropolis is naturally the most abounding market for labor. On the other hand, overgrowth brings certain disadvantages both for the operation of factories and for the comfort of living. During recent years, moreover, the economic and social handicaps of the smaller town have been disappearing. Already it seems likely that factory industry is increasing faster in medium-sized and smaller places than in the great urban centers, though not till the census of 1930

can the movement be satisfactorily measured. The tendency of manufactures to expand toward the West and the South will be accelerated as the balance of advantages turns more against the big city. The first movement of industry out from the great centers is naturally toward towns close to them, but gradually the towns farther away get their share of gain from any decentralizing trend.

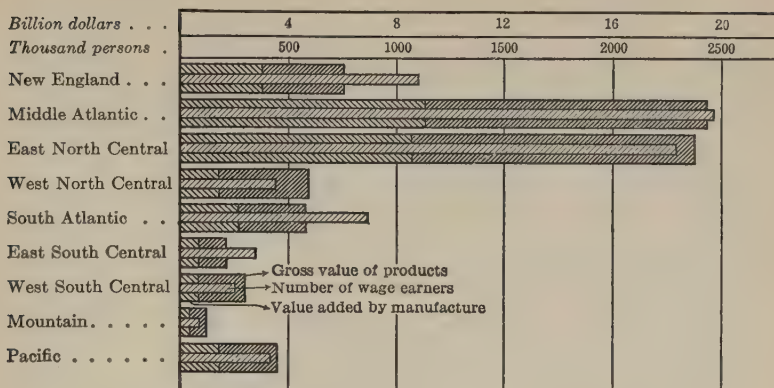
SECTION 6. POSITION OF THE GEOGRAPHIC DIVISIONS AND STATES

Geographic Divisions

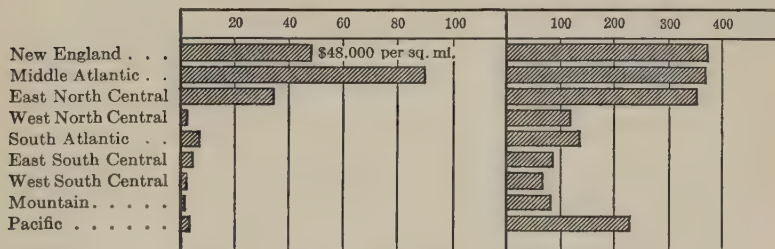
The considerations above set forth enable us to understand why it is that the New England, Middle Atlantic, and East North Central divisions, with less than one seventh of the area of the country, account for three fourths of its manufactures. They have great advantages: they have accessibility to coal (most essential of all materials), to iron (by way of the Great Lakes), to cement, and to all imported raw materials; they are themselves the greatest market for manufactured goods; they possess a convenient outlet to foreign markets; and, above all, they had the first start. Beginning early with the basic industries, those requiring the most power, and those producing the most necessary lighter commodities, the skill of labor and of management thus developed paved the way for a vast expansion of other and more elaborative industries, in which purely natural factors play little part in determining the location of factories.

In Fig. 74, *A*, the most significant element is that part of the bars representing value which shows the value added to materials by the process of manufacture. The Middle Atlantic still slightly leads the much larger East North Central division in manufacturing industries. The degree of concentration in this division is suggested by the fact that the value added to materials by its factories is \$90,000 per square mile of its area (see Fig. 74, *B*). The New England and

A. VALUE OF PRODUCTS AND NUMBER OF WAGE-EARNERS



B. THOUSANDS OF DOLLARS C. DOLLARS PER INHABITANT



D. PER CENT E. DOLLARS F. PER CENT

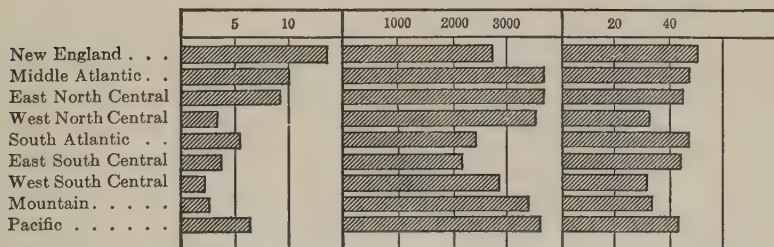


FIG. 74. Diagram showing statistics of manufactures, by divisions

The data relate to 1927. In section *A* the broad bar represents values according to the scale at the top, and the narrow bar the number of wage-earners (not including salaried employees). The gross values involve much duplication. Section *B* shows the value added to materials by manufacture per square mile of territory, and section *C* that value per inhabitant. Section *D* indicates what proportion of the population consists of factory wage-earners. Section *E* gives the average value added to materials per wage-earner. Section *F* shows what proportion the value added to materials forms of the gross value of products

East North Central divisions also show a very high ratio of value to area. Once outside the northeastern sections the ratio drops sharply; for the South Atlantic division, which ranks fourth in this respect, it is about \$8000 per square mile, and in the far-flung Mountain division only a few hundred dollars. In gross value of products (including the materials) the West North Central division ranks a little ahead of the South Atlantic, but in value added by the factories themselves the latter stands decidedly higher despite its much smaller size. This division also far outranks the other two sections of the South.

The leadership of the northeastern states in manufacture accounts for the fact that their population is much denser than elsewhere in the country. As might be expected, a very large part of their people are factory workers (see Fig. 74, *D*). From $9\frac{1}{2}$ to $13\frac{1}{2}$ per cent of the total population (of both sexes and all ages) in the three northeastern divisions are employed as factory wage-earners; elsewhere the ratio ranges only from about 2 to 6 per cent. Consequently the value added to materials by manufacture per capita of the total population in each of the three northeastern divisions is around \$350, whereas in most of the other sections it falls between \$65 and \$135. For the Pacific section, however, the amount is over \$220 (see Fig. 74, *C*).

A very different picture appears when the value created by manufacturing industry is compared not with the total population but with the number of wage-earners in the factories. The average value produced per wage-earner — which is not to be taken in the sense of the average value created by the wage-earner's own effort — varies with the rate of wages as well as with the amount of capital and the rate of return secured. Five of the nine divisions show relatively little difference in this respect; the averages in them range from about \$3400 to \$3700 per wage-earner. In New England, however, the average falls to about \$2700, and in the South Atlantic and East South Central divisions it is still lower. For New England the explanation lies chiefly in the

comparative depression which that section has suffered in recent years, resulting in some reduction of wages and in decided reduction of return on capital: its cotton industry has been hard pressed by Southern competition and by contraction of foreign markets, and its shoe factories have encountered increasing competition from new plants in the Middle West. The fact that wages are lower in the South than elsewhere accounts for the smaller average value of output per wage-earner in that region.

Although value added to materials by the factories furnishes the truest measure of the importance of the several sections in manufactures, a certain interest attaches to the data of gross value of products, especially since the ratio between it and "value added" gives some indication of the character of the industries of the divisions. The gross value as here shown involves an immense duplication due to the use of the product of one factory as material for another in the same division. It is certain that such doubling up of values is much greater in the leading manufacturing regions than in those where industry is less advanced.

Even as it is, the share of the gross value of products which represents the contribution of the factories themselves is decidedly higher in the New England, Middle Atlantic, and East North Central divisions, where duplication of materials counts most heavily, than in the two West Central divisions and Mountain division (see Fig. 74, *F*). The industries of the northeastern sections subject materials to greater elaboration than do those of the less important manufacturing regions. In the West North Central division, for example, a very considerable fraction of the manufacturing industry has to do with foodstuffs, the transformation of which is relatively inexpensive. In the West South Central division, again, the major industry is petroleum-refining, in which the value of the crude oil is much greater than the cost of the refining process. Relatively few factories which turn out complex and expensive products worth many times more than the original raw materials are found outside the great

industrial region stretching from the Atlantic to the Great Lakes. The fact that in the South Atlantic, East South Central, and Pacific divisions the ratio of "value added to materials" to gross value of output is nearly as high as in the Northeast is misleading, since in these divisions the industries are mostly of such a character that the gross value of manufactured products involves much less duplication of partly finished materials.

States

The leading manufacturing states are, in the order of value added to materials by manufacture, New York, with nearly one sixth of the total for the country; Pennsylvania; Illinois and Ohio, close rivals for third place; Michigan, Massachusetts, and New Jersey. These seven states together represent about five eighths of the factory industry of the United States (see Fig. 75). North Carolina has a marked lead over all the other Southern states, and is followed by Texas, Maryland, and Virginia. Half a dozen of the other states of the South rank close together. West of the Mississippi the leading manufacturing state is California, owing its position chiefly to the excellent power facilities afforded by falling water and petroleum. Next comes Missouri; its principal city, St. Louis, stands sixth among all those of the country in value created by manufacture.

Fig. 75 shows also the relation of factory industry to population, comparing the average "value added by manufacture" per person living in the several states (not per factory worker). Of course these averages are usually highest where a great proportion of the people are employed in factories. Michigan, however, with its automobile industry, notable for high wages, big capital investment, and liberal profits, ranks with Connecticut in leadership among the states in value per capita, notwithstanding that a number of states have a larger proportion of their population engaged in manufactures.

DOLLARS PER INHABITANT

BILLIONS OF DOLLARS

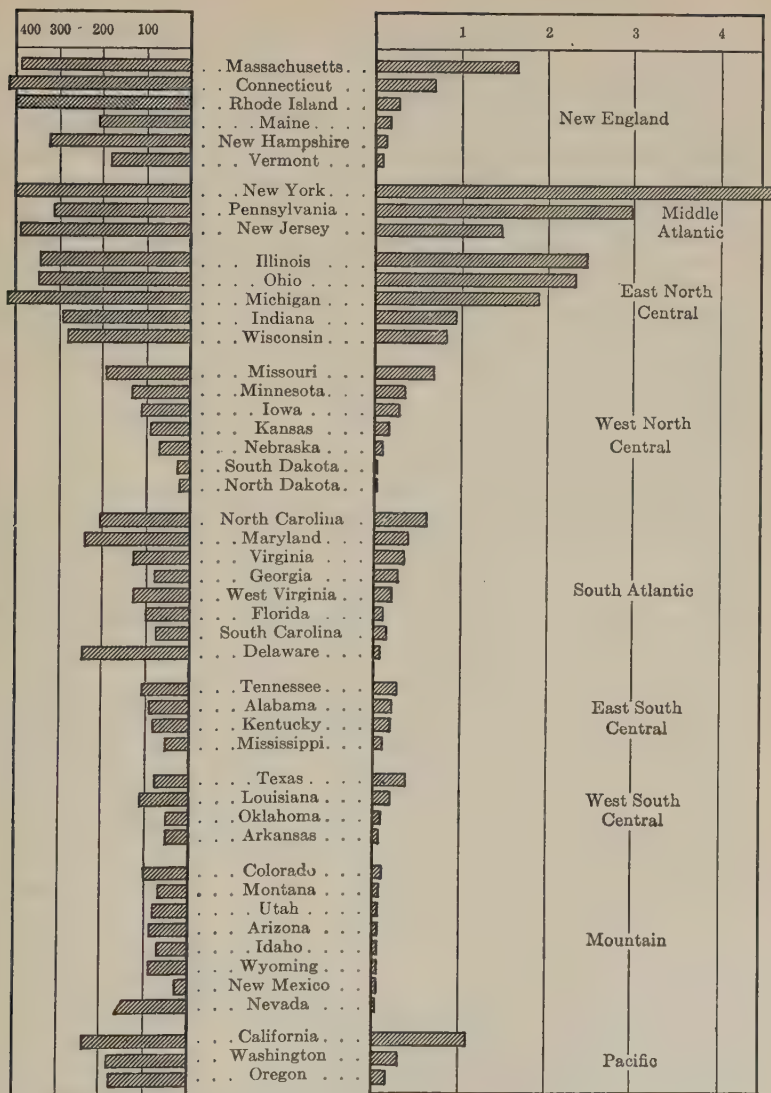


FIG. 75. Diagram showing the manufacturing industries by states: value added to materials by manufacture

The bars to the right show the value added to materials in absolute amount, and those to the left the average of that value per inhabitant of the state (not the average per person employed in manufacturing industry). The data relate to 1927

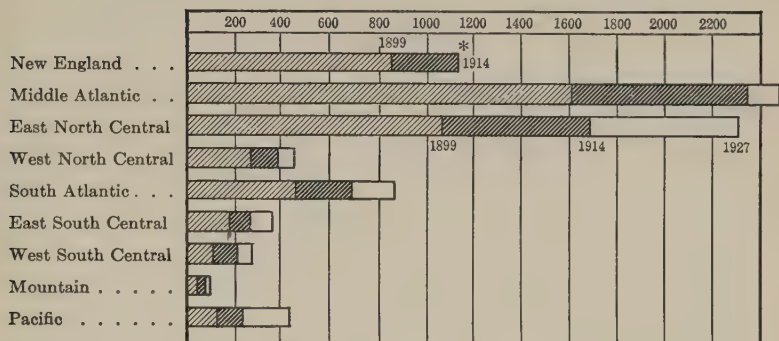
Growth of Manufactures in the Several Divisions

As has been pointed out elsewhere, the relative growth of population in the several sections of the United States has in recent decades been, and in the future will continue to be, largely dependent on the expansion of manufactures. Even should the postwar trend toward a shift from manufacturing to service occupations persist, the dependence of the commercial, professional, and personal-service workers on manufactures is such that where the number of factory employees declines least, there the growth in total population will probably be greatest. Comparison of the growth of manufactures in the several sections since the beginning of the century is of much interest not only in itself but also as throwing some light on probable future tendencies. The only satisfactory measuring stick for this purpose is furnished by the number of wage-earners (see Fig. 76). The fluctuations in prices, affecting differently the industries of different sections, more or less preclude use of values for comparing growth of factory output.

Naturally some of the newer sections with small populations have advanced in manufactures at a faster pace than the older regions; but the lead of the latter is so wide that it would take many decades for the others to overtake them should the same relative rates of growth continue. In absolute numbers the three northeastern divisions added about 2,350,000 to the number of their factory workers between 1899 and 1927, as compared with about 1,300,000 for the other six sections combined. However, so far as New England is concerned, this growth was confined to the period before 1914, and for the Middle Atlantic division it was chiefly before that time.

The most striking phenomenon disclosed by the diagram is the very rapid growth of factory industry in the East North Central division. From 1914 to 1927 this section added nearly as many factory wage-earners as all the rest of the country put together. Even the percentage of increase

A. NUMBER OF WAGE-EARNERS, IN THOUSANDS



B. RELATIVE NUMBERS (1899 AS 100)

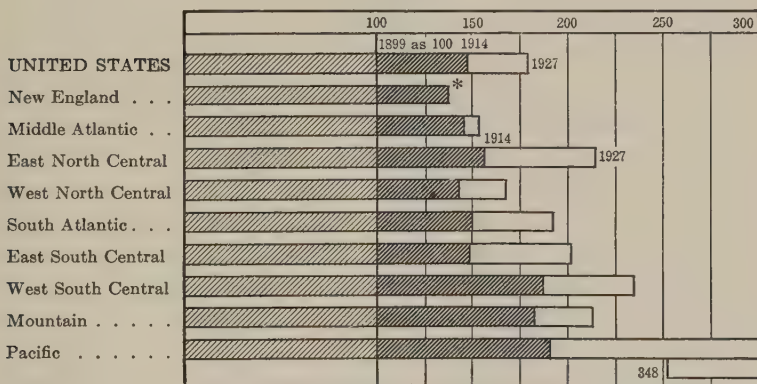


FIG. 76. Diagram showing the increase in the number of wage-earners in factories since 1899, by geographic divisions

In each section of the diagram each bar affords a comparison between 1899, 1914, and 1927, section *A* being in absolute numbers and section *B* in relative numbers on the basis of the number of wage-earners in 1899 taken as 100. For example, in the Middle Atlantic division the number in 1899 was about 1,610,000, rising in 1914 to about 2,350,000 and in 1927 to nearly 2,500,000. For 1914 the increase over 1899 in this geographic division was about 46 per cent (the relative number being 146) and for 1927 about 55 per cent

* The number of workers in the factories of New England was $3\frac{1}{2}$ per cent less in 1927 than in 1914.

was higher than anywhere else except on the Pacific coast. Already a giant in industry, this section is just now beating the pace of most smaller competitors in growth. Endowed with natural resources quite comparable with those of the Middle Atlantic division, the states along Lake Erie and Lake Michigan are naturally the first to benefit by the pushing out of industry from its original centers. They can readily draw labor from their neighbors to the east. They present living conditions essentially similar. They are nearer to the geographical center of population and thus have a certain advantage in the distribution of products. It is perhaps partly by accident, but certainly largely by reason of its natural advantages, that Michigan has become the seat of the most rapidly expanding of the major industries, that of motor-car manufacture.

Next to the Middle Atlantic and East North Central divisions those which between 1899 and 1927 showed the greatest absolute increase in the number of factory workers are the South Atlantic and Pacific sections; the Pacific section also leads all divisions of the country in percentage of increase, thanks to the great development of hydroelectric power and of petroleum fuel. Although the other two Southern divisions show for the period since 1899 a somewhat more rapid relative growth than the South Atlantic, it would take a long time for them, at the pace set, to overtake their eastern neighbor.

There is thus disclosed, as might be expected, a certain tendency away from the concentration of manufactures in the older industrial states along the North Atlantic seaboard. Thus far the biggest gainer has been the group of states along the Great Lakes, which most resemble in resources, character of people, and conditions of life the original centers of factory industry. No doubt the circumference of the highly industrialized region will gradually push outward toward the south and west. Meanwhile the development of specialized resources and the possession of special advantages are causing particular types of factories to spring up all over

the country. There is no reason to doubt, however, that the region east of the Mississippi and north of the Ohio and Potomac will long continue to maintain a marked lead. During the greater part of American history the growth of national population has tended to push agriculture farther and farther to the west; it exerts far less pressure upon the geographical distribution of manufactures.

SECTION 7. INDUSTRIES OF THE SEVERAL GEOGRAPHIC DIVISIONS¹

Space will permit only a broad and necessarily somewhat rough description of the type of industries characteristic of each section of the country and the mention of a few of the major branches in each. It should be borne in mind in this connection that to say that in a given region a certain industry is of importance by no means necessarily implies that it is widespread through the region. Its importance may be confined to a single state or to a few individual cities. Herein the production of fabricated commodities differs greatly from that of major farm products, which by nature must occupy large areas.

The character of the agriculture of a given section can in considerable measure be predicted from conditions of soil, climate, and relation to markets; but inherent natural forces are, as we have seen, much less dominant in determining the character of its factory industries. To explain why a given industry has a certain home would in many cases be to enter the realm of history — to search out perhaps a mere accident of early events. In a broad way it may be said that the character of the manufactures of the great industrial section of the Northeast, although partly due to the nature of its resources, is in greater part due to other causes; the lighter industries, being relatively free in the choice of habitat, have mainly taken up their abode there. The major industries elsewhere in the country are mostly of the type

¹ For states in each division see map on page 307.

more closely tied to the sources of materials: they are heavy industries. There are, of course, many individual exceptions to these general statements.

New England

The industries of New England, the first section to develop the modern factory system, are chiefly of the light order. Most of them use materials brought from other parts of the country or from abroad, and distribute their products widely. Apart from its forests, now much depleted, New England has few raw-material resources; the paper and pulp mills of Maine, New Hampshire, and Vermont are almost the only factories that are tied to their sources of supply. The original leadership of the New England division in manufacture was due mainly to Yankee thrift, ingenuity, and enterprise, but partly to its waterfalls, water being the only source of mechanical power in the early days. The first of these factors still operates; the second now counts for relatively little, the expansion of industries having forced New England to rely for power largely on coal brought from outside its borders. Industries requiring great power, as well as those using heavy materials, are mostly absent. But the skill of labor and management born of long experience, as well as proximity to the great Eastern centers of population, have enabled this section to retain the many varied industries of a more elaborative type and in most cases to expand them.

Textiles are still the most important products of New England factories, though they are less dominant than formerly. Large towns, such as Fall River, New Bedford, Lawrence, Lowell, and Manchester, are all but given over to whirling spindles and clattering looms. Then there are "shoe towns" — Lynn, Haverhill, Brockton, and others — making every type of footwear from heavy boots to dainty dancing slippers. Rubber footwear and other rubber goods are also important products. Although New England produces no metals and makes few massive articles of metal,

the variety of lighter products of steel, brass, and other metals turned out by its factories is legion. Light types of machinery, electrical apparatus, hardware, tools, cutlery, plated ware, watches, and jewelry are all important items in its output. New England is also a home of fine printing: many books and periodicals published elsewhere are "manufactured" here besides those which bear a New England imprint. This section leads all others, moreover, in the production of fine grades of paper.

The Middle Atlantic Division

New York, New Jersey, and Pennsylvania owe their position of leadership in American manufacturing industry in no small part to the splendid coal resources of Pennsylvania, which form the basis for a number of heavy industries. Nevertheless the bulk of the factory output of this division, in value, consists of light products. Here the same forces that have built New England's industries are at work. The factories of the Middle Atlantic section turn out some of almost everything and vast quantities of many things. Their products range from the most massive and cheap to the most delicate and most costly. The two biggest industries — the clothing industry and that of steel — stand almost at opposite poles in their character.

Though light industries particularly characterize the eastern part of this section, some important heavy industries are found there as well. Thus, sugar refineries seek tidewater to bring the raw material to their doors, and hence they cluster about the great harbors. So do oil refineries, which are fed either by vessels from the Gulf of Mexico or by pipe lines from the distant interior, and find the seaboard of great advantage for the export of finished products. Some important steel-works, using chiefly local or imported ores, are situated in eastern Pennsylvania. The cement industry of the Lehigh valley, where raw material of exceptional quality is found, is another heavy industry of great importance.

New York City, overwhelmingly dominant in the commerce and finance of the United States, is also the nation's leading manufacturing city, though its products are so varied that it scarcely stands out as chief in any one of the major industries except the manufacture of clothing and the printing and publishing business. The giant metropolis is too crowded to tolerate the huge plants of the heavy industries. Among many other products of the lighter industries of the Middle Atlantic division may be mentioned knit goods, silk goods, shirts, collars, and men's furnishings, millinery, fur goods, carpets and rugs, fine leather and leather manufactures, chemicals of many sorts, tobacco manufactures, machinery of great variety, automobiles in considerable numbers, electrical equipment, pottery, musical and technical instruments and supplies, and many small or elaborate articles of metal.

The abundance and high quality of its bituminous coal have made western Pennsylvania the world's greatest center of the steel business, the "heavy" industry par excellence. The Pittsburgh district originates a larger railway tonnage of manufactured goods (as distinguished from raw materials) than any other of twice its area in the United States, despite the fact that a very great part of the material entering into this tonnage must be brought from far-off Lake Superior. Coke-manufacturing on a huge scale goes hand in hand with the manufacture of iron. Apart from the heavier forms of steel western Pennsylvania and western New York make many more advanced metal manufactures, such as machinery, railway cars, and electrical apparatus. The Pittsburgh district is also the principal center of glass production in the United States.

The East North Central Division

The manufacturing industry of the Lake states (Ohio, Indiana, Illinois, Michigan, and Wisconsin) greatly resembles that of the Middle Atlantic division. Although one or two

industries that cling close to the sea are absent and although textile manufactures are little developed, the division outranks its eastern neighbor in a number of other industries. Some of these grow out of its proximity to the centers of agricultural production or out of its forest resources; others, out of the sheer enterprise of its people. There is perhaps a slightly greater tendency than in the states farther east to base factory industries on local supplies of materials, but the lighter industries are many and are rapidly advancing.

Among the heavy industries of the division that of iron and steel is much the most important, though in gross value of products meat-packing is a fairly close rival. For iron manufacture the coasts of Lake Erie and Lake Michigan offer natural advantages quite comparable with those of Pennsylvania, the somewhat inferior position as to coal being offset by the greater accessibility of iron ore from Lake Superior. The forests of northern Wisconsin and Michigan are the seat of a considerable though declining lumber industry and of a large and growing paper manufacture. The local production of petroleum, supplemented in recent years by larger quantities piped from the Mid-continent oil field, forms the basis of important refineries, especially near Chicago. That city is the world's greatest center of meat-packing, about three million cattle, as many sheep, and about twice as many hogs being slaughtered there annually. The packing business is also of considerable magnitude in several other cities of the division.

Of the industries making more advanced products the leaders are those which use steel as their major constituent material. The ready availability of that metal has had something to do with this development. The geographical position of the Lake states, lying midway between the great Eastern and Western market areas, has been a favoring factor. Moreover, there has been a natural tendency for industries that use steel to spread out from their original centers farther east. The automobile industry has fairly shot forward till now it creates a value much greater than any

other of the division. Michigan is far in the lead in motor-car production, but every state in the division has a considerable output. Besides motor vehicles, which are first of all machines, the East North Central division produces a great volume of other machinery — some of highly elaborate type, but perhaps more of the somewhat massive order. In making agricultural implements this division leads the whole world. The same is true as to cash registers and adding machines. Stoves, hardware, and tools are other important products of iron and steel in this section. The manufacture of electrical equipment is also highly developed.

Other advanced manufactured products include furniture, pottery, glass, boots and shoes, brass and bronze articles, chemicals, and miscellaneous food preparations. In the large cities, especially Chicago, much clothing is manufactured. Particularly striking is the concentration of the rubber-tire industry of the country at Akron, a phenomenon for which no fundamental geographical causes can be assigned. This industry ranks fourth among all those of the division in the value added to materials.

The West North Central Division

When the Mississippi is crossed, manufacturing industry at once becomes both less important and less varied. The West North Central division is poorer in fuel and power than its neighbors to the east, and though it harbors in its far corner the principal iron deposits of the country, the Great Lakes make the ore more available to other states than to those of this division. The trans-Mississippi states lie too far beyond the regions of dense population to be as yet a particularly eligible site for those advanced manufactures that are more or less independent as regards the geographical sources of material and power; hence the leading industries are concerned with the transformation of local materials, especially farm products. At the same time the large cities are steadily gaining ground in the lighter industries.

By far the largest branches of manufacture in the West North Central division from the standpoint of gross value of products (including materials used) are meat-packing, flour-milling, and the manufacture of butter and cheese, though in net contribution of value by the factories they are not so dominant. All three are widespread industries, but the big packing plants in such cities as Omaha, Kansas City, East St. Louis (in Illinois, but essentially belonging to the West North Central division), Sioux City, and St. Paul, and the giant flour mills of Minneapolis and Kansas City, handle a large part of the total output of the division in their respective branches. The forests of Minnesota support a considerable lumber and paper industry, and oil from the Mid-continent field, partly produced within the division and partly pumped in, is refined (chiefly in Kansas and Missouri) in quantities more or less adequate for the needs of the section. Omaha has important refineries of nonferrous metals, handling the crude product of Mountain-state smelters.

Among the more advanced factory products of this division may be mentioned motor vehicles (especially in Missouri and Minnesota, the business being in considerable part in the nature of assembly plants), farm machinery, clothing, boots and shoes, and chemicals. St. Louis is the leading city of the division in all these except farm machinery; it has become one of the most important centers of the United States for the manufacture of pharmaceutical and fine chemical articles. As in all parts of the country outside the three northeastern divisions, a very considerable fraction of the total value of factory output is contributed by plants of purely local significance — printing shops, planing mills, railroad repair shops, and the like.

The South Atlantic Division

The long line of states stretching along the South Atlantic seaboard possesses more varied industries than the West North Central section or than either of the other Southern

divisions. Maryland and Delaware and the northern part of West Virginia naturally partake of the advanced industrial character of adjoining Pennsylvania. Farther south cheap power and relatively low wages have favored not only industries using local materials but some industries of relatively simple type that must bring materials from elsewhere.

The principal industries of Maryland and Delaware, largely centering in Baltimore and Wilmington, are oil-refining and steel manufacture, both relying on water-borne materials, the manufacture of clothing and of fertilizers and other chemicals, tanning, shipbuilding, and the canning of food, but there are many others. West Virginia's industries are somewhat more of the heavy type; it is an important manufacturer of iron and steel and also of coke, though more of its excellent coking coal is sent into states farther north for transformation. This state ranks next to Pennsylvania in the glass industry.

In the states south of Maryland and West Virginia the forests furnish the basis for important industries; these include not only sawmills and the manufacture of paper, but the production of rosin and turpentine, of which this region furnishes most of the American supply as well as exporting large quantities. The abundance of good hard wood has been a favoring factor, though by no means the dominating one, in causing a large development of more advanced wood-using industries, especially in North Carolina; these make furniture, implement handles, wheel spokes, and many other articles. Although raw tobacco is easily transported and of high unit value, it is but natural that the large and high-grade output of the South Atlantic fields should have become the basis of an important manufacturing industry, centering chiefly in Virginia and North Carolina; the latter is by far the leader among all the states of the country in tobacco manufacture. The states along the South Atlantic coast are the largest consumers of artificial fertilizers, and for that reason, as well as because of the convenient phos-

phate deposits of Florida, many factories for making these are found there, especially in seaboard cities.

Among industries less tied up either with local raw materials or local markets may be mentioned the shipyards along Hampton Roads. Much more important, however, is the manufacture of cotton textiles. The rapid growth of cotton mills in Georgia, South Carolina, and still more in North Carolina is only in small part attributable to the proximity of cotton fields; much of the cotton used is brought from distant states at a cost approximating that required to carry it to New England. Much more influential are the cheap power and the cheap labor. The cotton industry is by far the largest of all the branches of manufacture in the South Atlantic division, and it continues to grow rapidly despite the slowness with which the demand of this country and of foreign markets expands. The South Atlantic division now surpasses New England in the value of cotton goods produced.

The East South Central Division

To a somewhat greater extent than in the South Atlantic division the industries of the group of states lying next to the west are based either on local materials or on local consumption. Much the largest branches are iron and steel and lumber manufacture. This is the only part of the country in which good iron ore and good coal lie close together. Were the demand for steel in the South at all equal to that in the North, Alabama might perhaps come to rival Pennsylvania and Ohio in the heavy-steel industry. Birmingham boasts itself the Pittsburgh of the South. The sawmills of Alabama and Mississippi are among the biggest contributors of the nation's supply of softwood lumber. Farther north the hardwood forests are the basis of a considerable manufacture both of lumber and of cooperage. Cottonseed-oil extraction and refining are scattered in various parts of the division. Alabama manufactures a large quantity of cement.

Apart from industries based chiefly on its own raw materials the division has few of more than local significance. Louisville is a considerable manufacturer of shoes and clothing, and of tobacco products, besides having the usual variety of industries incident to a large city. Alabama has become important in the manufacture of cotton goods.

The West South Central Division

The most characteristic factory industries of the group of Southern states west of the Mississippi — Louisiana, Texas, Arkansas, and Oklahoma — are those growing out of their natural resources: oil fields, forests, and farm and grazing lands. In point of gross value of output oil-refining stands far above all others, and although this industry, here as elsewhere, adds no great proportion to the value of the basic material, it stands at the top of all in the division in respect to value created by manufacturing processes. Refineries are found in all states of the division, but the largest are at the seaboard in Texas and Louisiana, whence the product can easily move to the Atlantic states or abroad. The industries based on forest materials surpass even those of the East South Central division and are essentially similar in character; Louisiana is the second state of the Union in lumber output (value). The cleaning and polishing of rice is a manufacturing industry almost peculiar to Louisiana and Texas. The meat-packing, flour-milling, and cottonseed-oil industries are important, especially in Texas and Oklahoma. The latter has also zinc-smelting works to handle the local ore. In Louisiana are large sugar refineries fed both from cane fields of the state and with raw sugar from Cuba.

Apart from these industries and from the usual run of plants making products for purely local use, the West South Central division has scarcely yet developed important manufactures. However, the fact that it shows so high a percentage growth in value of factory output points to a distinct tendency toward industrial development.

The Mountain Division

Even more than the factories of the South, those of the Rocky Mountain region are restricted to the working up of local raw material that cannot afford long-distance transportation, and the supply of simple products for local needs. Since the population is very sparse, activities of the latter type are relatively small in magnitude. The leading manufacturing industries are those connected with mining — the smelting of metals and refining of petroleum. Oil refineries are confined to Wyoming and Colorado, but big smelters are found in almost every state of the region. Even though the smelting process is relatively inexpensive, the value created by manufacturing is much greater in this branch than in any other. Other industries using local raw materials turn out coke (Colorado), cement, flour, and meat products.

The Pacific Coast

Owing to its distance from the principal centers of manufacture and its considerable and rapidly growing population, the Pacific division is vigorously seeking to diversify its manufactures. California, Oregon, and Washington, especially California, are gradually coming to make many articles which the Middle West and the South, with lower transport costs, are content to buy from the great industrial region of the Northeast. Cheap power has been a favoring factor in this development. Nevertheless the largest factory industries of the coast are still those resting on special natural resources. These are sawmilling, petroleum-refining, and the canning and preserving of fruits and vegetables. The first is most highly developed in Washington and Oregon; the others, in California. The Pacific states ship great quantities of lumber to the East by rail or water, and have large outlets for this product in foreign countries. Their canned and dried fruits find even wider markets. The product of the oil refineries goes largely to supply the huge

consumption of the coast states themselves, though some is shipped to the East by the Panama Canal or to the Orient and other foreign lands. Other industries using local materials include cement manufacture, paper-making, meat-packing, flour-milling, butter-making, and fish-canning. Most of the output of these is consumed on the coast itself, except that of the fish canneries.

Factory products of the more advanced type that have already become of material importance in this section include automobiles (chiefly assembly plants), various kinds of machinery, ships, tin cans, furniture, clothing, explosives, paints, and sundry other chemicals.

The one industry of which the Pacific coast has almost the monopoly is that of making moving-picture films; but, as has already been stated, the manufacturing aspects of this business far from measure its magnitude or its social significance. Hollywood pictures are shown to hundreds of millions all over the world; indeed the American films dominate on the screens even of most of those countries which are themselves important producers in this field of art.

CHAPTER XI

TRANSPORTATION AND COMMUNICATION

SECTION 1. GENERAL ASPECTS

The volume of transportation in the United States is greater than that in all other countries put together. Not counting the large highway traffic, the steam railways and the water carriers move about 1,900,000,000 tons of freight yearly, or 16 tons for each inhabitant. On the average this freight is hauled at least 325 miles. The work performed is therefore equivalent to moving one ton 600,000,000,000 miles or more, six or seven thousand times the distance to the sun. A train of more than average capacity,—say of forty cars carrying each 25 tons—would have to encircle the earth some twenty-four thousand times to carry this traffic.

Transportation and communication in the United States employ about three million persons, or $7\frac{1}{2}$ per cent of all gainfully employed workers. This does not include those making, repairing, or selling transportation equipment or supplies—a very large number, increasing with the rapid multiplication of motor cars. Apart from the immense movement of private automobiles, the annual receipts of enterprises of transportation and communication are between ten and eleven billion dollars, or nearly one eighth of the total national income. In few countries is so large a share of the productive energy of the people devoted to these tasks. The high development of transportation in America is partly the result of its wealth, the great volume of goods produced, and the ability of the people to pay for moving goods and persons; in part it is due to the wide area of the

country and its comparatively sparse population, which make long hauls and long journeys necessary. The immense volume of traffic is a cause contributing to the large output of commodities as well as the result of that output. Without efficient carriers American farms, mines, and factories could neither obtain materials nor deliver products in such great quantities. The large use of means of communication — post, telegraph, and telephone — is likewise both effect and cause of the general high level of industrial life.

For most classes of transportation and communication official statistics of gross receipts are available either annually or at intervals. In the statement given below estimates have been made to bring to date the figures for those branches for which no recent authoritative data exist, or to round out those for which only partial returns are made annually. The item for cab, bus, and truck service is little more than a mere guess, and is subject to a large measure of error.

APPROXIMATE ANNUAL GROSS RECEIPTS

Railways (steam)	\$6,250,000,000
Water carriers	850,000,000
Express companies	300,000,000
Pullman Company	80,000,000
Post office	690,000,000
Street and electric railways	1,050,000,000
Cab, bus, and truck service <i>for hire</i>	500,000,000
Telephone companies	1,025,000,000
Telegraph companies	210,000,000
Total, excluding about \$300,000,000 of duplication, ¹ approximately	\$10,650,000,000

This statement shows no figure for the gross receipts of aviation enterprises, nor is the subject discussed in detail in this chapter. The changes from year to year and almost from month to month in this new form of activity are so

¹This duplication consists in payments to the railways by express companies, the Pullman Company, and the post office.

great that any statement which might be made now would immediately become out of date and misleading. Until within the last two or three years the United States has lagged somewhat behind the leading European countries in civil aviation, chiefly for the reason that those countries are under greater pressure to develop aviation for military purposes. Now, however, a new interest in aviation has become manifest in America, and the country seems already to have gained the lead over all others in this field.

SECTION 2. STEAM RAILWAYS IN AMERICA AND ABROAD

The steam railway is by far the most important transporter of commodities in the United States, as in most other countries, though it has yielded the palm to the automobile in the matter of passenger movement. The American railways carry about three times as much freight as the water carriers; this disregards length of haul and excludes mere terminal traffic in the harbors.

The United States has 249,000 miles of railway (length of line regardless of the number of tracks), or one third of the world's total. But the density of freight traffic on American railways is greater than even in the crowded countries of western Europe; consequently the ton-mileage of freight carried is materially greater than the total for all the rest of the world combined (see Fig. 77, *B*). A country of dense population, unless it be poverty-stricken, will naturally have a closer network of railways than one less thickly settled. The vast open spaces of the American Far West make no strong bid for the iron way. Most countries of western and central Europe have from four to fifteen times as many people per square mile as the United States has, and it is not surprising that several have more than twice as much railway per unit of area. That the United States possesses railways where there is a call for them is seen from the fact that east of the Mississippi and north of the Potomac and the Ohio the railway net is substantially as close-woven as

that of France or of Germany, although the population is less dense — only about two fifths as dense as in Germany. Very sparsely settled countries, such as Canada, Australia, and Argentina, have much less railway in proportion to their area than the United States.

Entirely different are the relations of railway mileage to population. Where people are crowded together, as in Europe, a moderate amount of mileage will bring the railway practically within reach of all. If more carrying capacity is needed, the economical thing is to double or multiply the number of tracks of the same lines (note that Fig. 77 shows line-mileage, not trackage) rather than to build new railways. It is only partly because the United States is richer than Europe that it has far more railway line in proportion to its population: the relatively low density of population has much to do with it. On the other hand, the much higher amount of mileage per capita in Canada and Australia, although it does reflect the prosperity of those new countries, is chiefly attributable to the extreme sparseness of settlement.

The fact is that the United States has practically all the railways of which it can make good use under the present distribution of population, and that the same holds true also of the countries of northwestern Europe — perhaps, indeed, one may fairly say as much even of Canada and Australia. On the other hand, there are many countries of eastern Europe, Asia, South America, and Africa where the very small railway mileage, although partly due to the fact that the people, in their poverty, have but little traffic to move, is also a result of lack of capital even to build lines that might be profitable in operation.

The size of a country and the degree of density of its population have much to do likewise with the railway ton-mileage (Fig. 77, *F*). The average freight haul in the country will naturally be short if you bump up against a boundary after one or two hundred miles. A better gauge of the adequacy of freight service is furnished by the number of tons moved

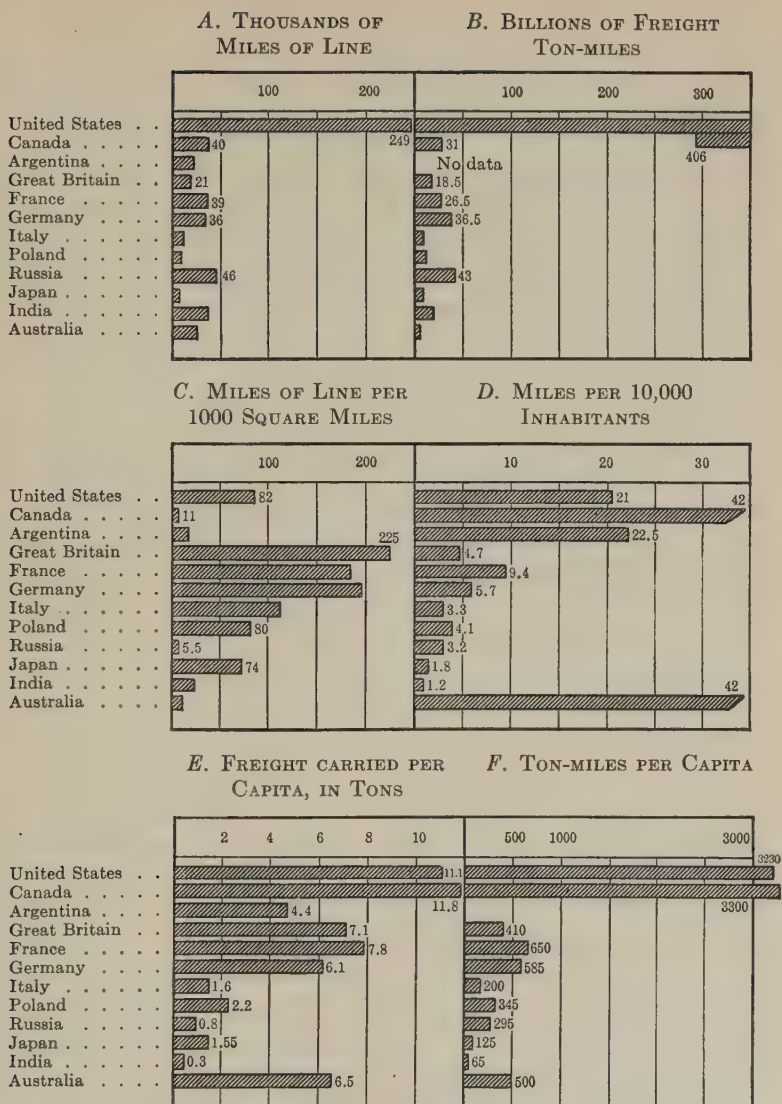


FIG. 77. Diagram showing comparative international railway statistics

The data relate for the most part to 1926. The mileage (section A) represents the line regardless of the number of tracks. The leading European countries have relatively more double-track or multiple-track line than the United States, and the United States has more than Canada, Argentina, or Australia. Tonnage of freight is expressed in terms of metric tons of 2205 pounds

than by the total distance covered. A high ton-mileage per inhabitant in a less densely peopled country like America is, however, evidence of exceptional ability to bear transportation costs, and hence of high standards of living. In proportion to population more tons of freight are moved in the United States than in any other country except its next-door neighbor Canada, where the average is not much larger (see Fig. 77, *E*). The average for the United States is about eleven tons per capita yearly. Those for the leading countries of northwestern Europe are, roughly speaking, about two thirds as high. In the poorer countries of the world the average sinks to only a ton or two — in China to about one tenth of a ton. In Canada and the United States, with their vast spaces and high wealth, the heavy freight tonnage is carried to exceptional distances. The average length of railway haul in the United States is over three hundred miles as compared, for example, with less than a hundred miles in Germany. Consequently the ton-mileage per inhabitant — the best available measure, though not a perfect one, of the effort expended on railway service — is from five to fifteen times as great in the United States and Canada as in the leading countries of Europe, to say nothing of Asia.

International comparisons of railway passenger traffic have no such significance as those of freight movement. The great differences between countries with respect to the use of automobiles quite disqualify the railway figures. In most countries of western Europe the number of railway journeys is materially higher, in relation to the population, than in the United States; and although the European journeys are shorter, the total passenger mileage per inhabitant is considerably higher in several of these countries than in this country. Although the chief explanation lies in the immense American motor-car traffic (see Section 7), the low fares available on European railways for those willing to take a cheaper service help to increase travel. All European countries have the class-traffic system, at least two classes being provided, usually three, and sometimes four,

with wide differences in rates. First-class cars are no better than the typical day coach of the American railway, and the fare is in general not very different. The European third-class charge is ordinarily only about half as high as the first-class fare. It is true that the large use of Pullman cars in the United States, and the fact that some trains carry only these cars, constitutes in a sense a class system, but the distinctions are neither so numerous nor so great as in the typical European country. To carry the practice of classification further is perhaps not feasible nor desirable in America, with its high level of incomes ; but, apart from any question of social distinction which may have fostered it in Europe, the system there lends itself to the needs of the masses of the people, most of whom use the cheaper service.

Whereas passenger fares in Europe average lower than in the United States, the opposite is true of the freight charges per ton per mile. The average in this country is 1.1 cents ; in Germany it is about 2 cents, and in England 3 cents. The difference is perhaps partly due to greater railway efficiency in America, making costs lower despite a much higher scale of wages. An important factor, however, is the great disparity in the length of hauls. Terminal switching, loading, and unloading represent everywhere a large element in costs of transportation. Where hauls are short these charges greatly affect the average per mile. It is for this reason that in the United States freight rates are much lower per mile for long hauls than for short hauls. The shipper or receiver of goods is, after all, less interested in cost per mile than in total cost of service, and where hauls are short the total cost may be less than in a country where rates are lower per mile but distances greater.

The casual traveler notes conspicuous differences between American and European railway conditions and practice. He sees in the United States bigger engines, bigger cars, greater specialization of cars to handle particular types of goods, longer freight trains, finer passenger cars, far greater use of sleeping cars, somewhat faster trains (except

perhaps as compared with England), and a more convenient and liberal handling of baggage. The country is justly proud of its efficient carriers. But these differences are partly caused by differences in the conditions to be met. Where hauls and journeys are short it does not pay to operate in precisely the same way as where they are several times longer. Differences in the character of goods to be moved, in climatic conditions, in the organization of production and of marketing, and in standards of living all affect the methods of railway service.

To run railways efficiently demands big-scale organization. Most of the American mileage is controlled by a relatively small number of large corporations. However, there is nothing approaching a concentration of the entire business under a single control as where governments operate railways. Moreover, in England, France, and some other countries where private operation prevails the number of separate companies is much smaller even than in the United States. But the aggregate of railway business is so much larger in this country than elsewhere that many of the individual companies are of immense magnitude. The Pennsylvania system and the New York Central system (with its affiliated lines) each have a greater freight ton-mileage than any foreign country in the world. The United States possesses a dozen or more other systems each with a business exceeding that of all but five or six of the foreign countries. Some fifty of the railway companies distinguished in the statistics handle together seven eighths of the total traffic of the United States. Many among these fifty are so bound together by direct or indirect ties that they represent hardly half that number of independent enterprises. Movements are under way to bring about still greater concentration, a plan fully approved in principle by most economists and publicists, and one which the Interstate Commerce Commission is actively promoting. Government regulation is generally considered a better preventive of excessive rates than indiscriminate competition between railways.

SECTION 3. THE GEOGRAPHY OF AMERICAN RAILWAYS

The geography of the American railway net is relatively simple; it is such as would be expected from the shape of the country and the distribution of its resources and population. Since the United States is a vast continental mass, without deep indentations of the sea or irregular land borders and for the most part without difficult mountain barriers, its railways can run in fairly direct lines.

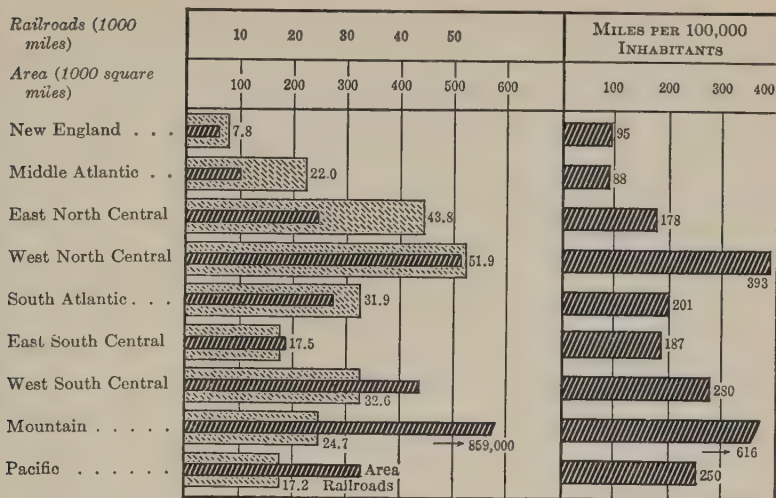
Owing to the great concentration of population in the Northeast the railways very generally head toward this area. Although a map that does not distinguish main lines from branch lines may look like a mere tangle, one that emphasizes main routes shows them mostly stretching from east to west and from northeast to south and southwest. What does not ordinarily appear on any map is the fact that as the main railways draw nearer to the North Atlantic coast their traffic becomes denser; the single-track line carries more and more trains, then gives way to double tracks and in some cases to triple and quadruple tracks, and in turn the traffic on these tracks becomes heavier and heavier as they sweep eastward. At the same time the branch lines and cross lines, the woof of the fabric of which the main lines are the warp, become more numerous as the population grows denser.

The relations of railway mileage to the area and population of the American states and geographic divisions illustrate the principles mentioned in Section 2. The thickly settled sections have much more line in proportion to area, but much less in proportion to inhabitants, than those of sparse population. In Fig. 78, *A*, the bars represent length of line, regardless of second or multiple tracks and switch tracks. Such tracks, of course, are more extensive where population is dense (compare Fig. 79, *A*); if they were included, the disparity between the divisions in the relation of railways to area would be greater than is shown, and the reverse disparity in their relation to population would be less.

The double bars in the upper section of the chart are so arranged that if there were a hundred miles of railway line to a thousand square miles of territory the two would be of equal length. This is not far from the actual density of the railway net in four of the divisions: the New England, the West North Central, the South Atlantic, and the East South Central. The ratio rises to 220 and 180 miles of line per 1000 square miles of area, respectively, in the two great industrial divisions, the Middle Atlantic and the East North Central, whereas in the West South Central and the two Far Western divisions it falls much below 100—in the Mountain division as low as 30. The Mountain division, on the other hand, has much more railway per inhabitant than any other. Not only must lines be long to reach its scattered people and resources, but its vast spaces must be traversed by the great systems that knit the more thickly settled Pacific slope to the Eastern centers. The division has over six hundred miles of railway per hundred thousand inhabitants as against less than a hundred in the two most densely populated sections, New England and the Middle Atlantic. For similar reasons the West North Central division has nearly twice as much railway mileage per capita as any section east of the Mississippi.

Statistics of railway traffic are not compiled by states. The Interstate Commerce Commission publishes totals for three great divisions of railways and for eight less comprehensive groups. The Eastern division covers roughly the territory north of the Ohio and Potomac rivers as far west as Chicago and (for certain lines) St. Louis. Within this division the so-called Great Lakes group comprises the more northerly lines (among others the New York Central and the Erie) and the Central Eastern group those farther south (among others the Pennsylvania and the Baltimore and Ohio). The Southern division includes all lines south of the Ohio and Potomac and east of the Mississippi. The Poca-hontas group of this division, which in some respects resembles the Central Eastern group more than it does the

A. RAILROAD LINE MILEAGE BY GEOGRAPHIC DIVISIONS



B. RAILWAY MILEAGE AND FREIGHT MOVEMENT BY TRAFFIC REGIONS

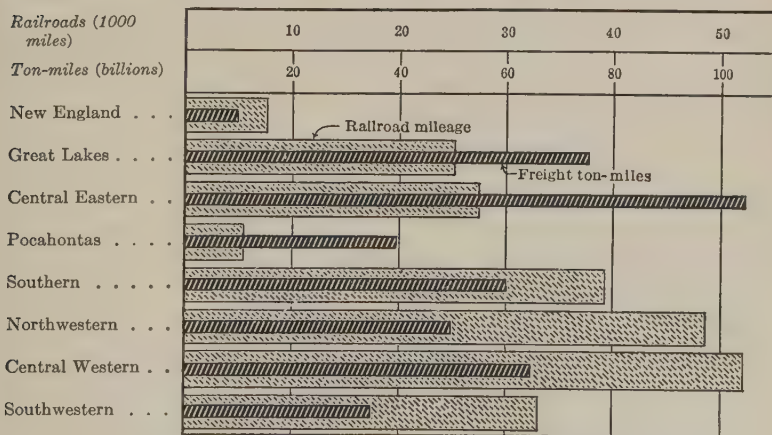


FIG. 78. Diagram showing railway mileage by geographic divisions and traffic regions and freight ton-mileage by traffic regions

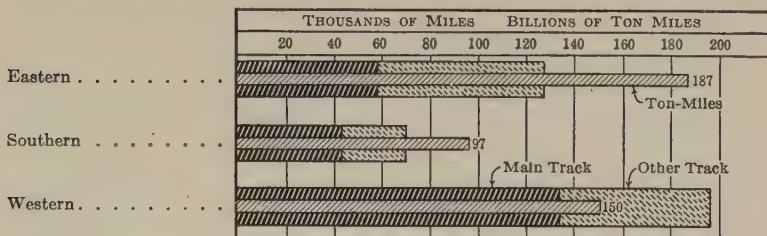
For states covered by the respective geographic divisions see map on page 307; for areas covered by the traffic regions see the text. The data of mileage represent length of line and not that of all track; double and multiple tracks are more common in the three northeastern divisions than elsewhere. The broad bars, measured by the upper scale, represent length of line; the narrow bars in section A represent area, and in section B ton-miles of freight. Section A relates to 1927 and B to the mean of 1926 and 1927; there was little change in 1928 or 1929

remainder of the Southern division, is made up of the lines running just south of the dividing rivers, lines which handle a good deal of through east-west traffic and an immense volume of coal from the mines of West Virginia, eastern Kentucky, and Virginia. The other groups are self-explanatory.

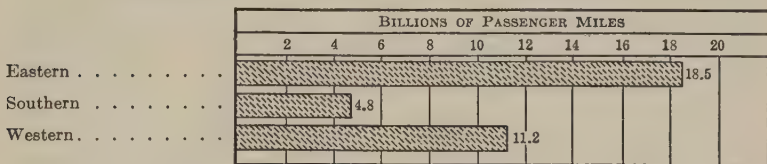
These divisions and groups show wide variations in density of traffic (see Figs. 78, *B*, and 79, *A*). In the United States as a whole each mile of line carries about 1,700,000 tons of freight in a year (that is, ton-miles of freight per mile of line); but if all tracks are counted, the ratio is only a little over 1,000,000 tons per mile. The railways of the Eastern division, with its dense population and its great factories and coal mines, carry about 3,200,000 tons per mile of line annually. Although they augment their capacity by supplementary tracks, so that their total mileage of tracks is more than double that of line, the railways of this division haul nearly 1,500,000 tons of freight traffic per mile of all track. On the other hand, the Western division has much less dense traffic — hardly one third as much per mile of line. Apart from the Pocahontas group, with unparalleled density of freight because of its heavy movement of coal and the small number of branch lines, the Southern railways strongly resemble the Western in traffic, although they surpass them considerably in amount carried per mile of line. The two principal groups of Eastern railways are statistically much alike, although the coal business of the Central Eastern group gives it a greater density of tonnage than the Great Lakes group. So, too, the Northwestern, Central Western, and Southwestern groups all bear a close family resemblance.

Passenger traffic is likewise far denser on the Eastern railways than elsewhere (see Fig. 79, *B*). The concentration of industry and commerce in the East causes a great amount of business travel; and, as compared with the South, the higher average income of the people contributes to the difference in passenger traffic.

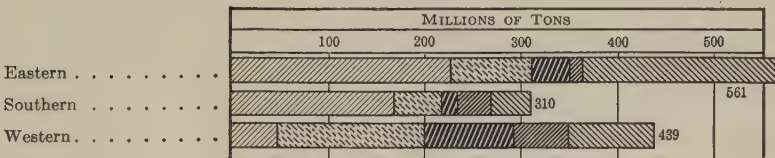
A. LINE MILEAGE, TRACK MILEAGE, AND ANNUAL FREIGHT TON-MILEAGE



B. PASSENGER TRAFFIC: NUMBER CARRIED ONE MILE ANNUALLY



C. ANNUAL TONNAGE OF REVENUE FREIGHT ORIGINATED, BY CLASSES



D. PERCENTAGE OF TOTAL REVENUE FREIGHT

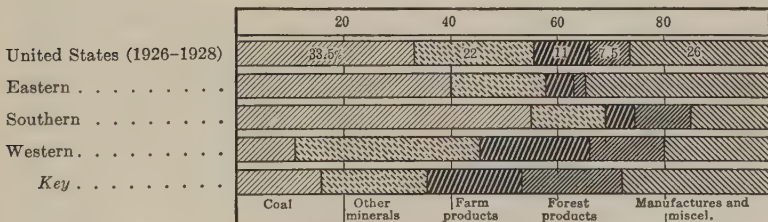


FIG. 79. Diagram showing railways and traffic in the Eastern, Southern, and Western districts

For definition of the areas covered see text. In section A (which relates to the mean of the three years 1926-1928) the broad bar represents thousands of miles both of line (first main track) and of all track. In sections C and D no regard is taken of differences in the average length of haul of the respective classes, with the result that the importance of "other minerals" is considerably exaggerated. The data in sections B, C, and D are the means for the years 1926 and 1927, except that in section D the bar for the United States as a whole represents the mean for the three years 1926 to 1928

SECTION 4. RAILWAY TRAFFIC

From the standpoint of railway revenue the several classes of traffic in 1928 ranked as follows (Class I railways only¹):

Freight	\$4,686,000,000
Passenger (proper)	900,000,000
Mail	104,000,000
Express	143,000,000
Other transportation	141,000,000
Revenue not from transportation	130,000,000
Total	<u>\$6,104,000,000</u>

The figures for mail and express represent only the payments to the railways by the government and the express companies, the railways themselves having nothing to do with the charges collected from the public. The proportion of railway revenue derived from freight service (nearly 77 per cent in 1928) is steadily rising owing to the effect of motor-car competition on the passenger business. In many foreign countries the share of passenger revenue in the total is considerably larger than in the United States.

Freight traffic in a country of the size of the United States and with highly developed industries is naturally immensely varied both as to commodities and as to hauls. A fifty-pound box may move a dozen miles, or a fifty-ton car may move two or three thousand miles. The bewildering complexity of traffic has thus far so discouraged the statisticians that we have scanty information as to the distance and direction of movement of the various classes of goods.

Long hauls are far more common for some commodities than for others. Citrus fruits, for example, originate in two distant corners of the country but are distributed throughout its length and breadth. Lumber from the Gulf region or from the North Pacific coast is carried many hundreds of

¹ Class I includes all railways with gross revenues exceeding \$1,000,000 annually. These account for about 98 per cent of the total revenue for all lines combined.

miles, often two thousand or more. On the other hand, clay, gravel, sand, stone, and brick, which make a huge show in the statistics of car-loadings, usually have to be hauled only short distances. Again, iron ore does not go very far by rail, the long-distance movement being mainly by the Great Lakes.¹ It should be borne in mind, too, that aside from making lower rates per mile for long hauls than for short hauls, the railways charge much more for some commodities than for others. The rate per mile on costly textiles or bulky furniture or elaborate machinery may be four or five times that on coal. Space occupied must be considered as well as weight. Not only is the expense of loading, unloading, and transporting much higher for some goods than for others, but the railways, properly enough, give consideration to value — to what the traffic can afford to pay.

For these reasons the familiar statistics of number of cars or of weight of the various commodities transported present a very incomplete picture. They show neither the volume of service rendered nor the amount paid for it. Nevertheless these data are of much interest (see Fig. 80).

Coal is overwhelmingly the largest item of railway traffic, whatever the measuring stick used. It makes up more than one third of the total tonnage; and since there is reason to believe that the average haul is not much different from that of the total traffic, coal probably accounts for about the same proportion of the aggregate ton-mileage, though by no means such a part of the freight revenue. This dominance of coal bears witness to the great use of power in American industries and in transportation itself, as well as to the demand for abundant heat in the home. In the Western district petroleum and water power often replace coal, and that commodity counts much less in railway traffic than elsewhere.

Other minerals are also a big factor in railway traffic, though their importance is much exaggerated by the bare data of weight, since hauls are very often short. The largest

¹ Ore often takes two rail hauls — to and from lake ports; in such cases it is counted twice in the tonnage and car-loading statistics.

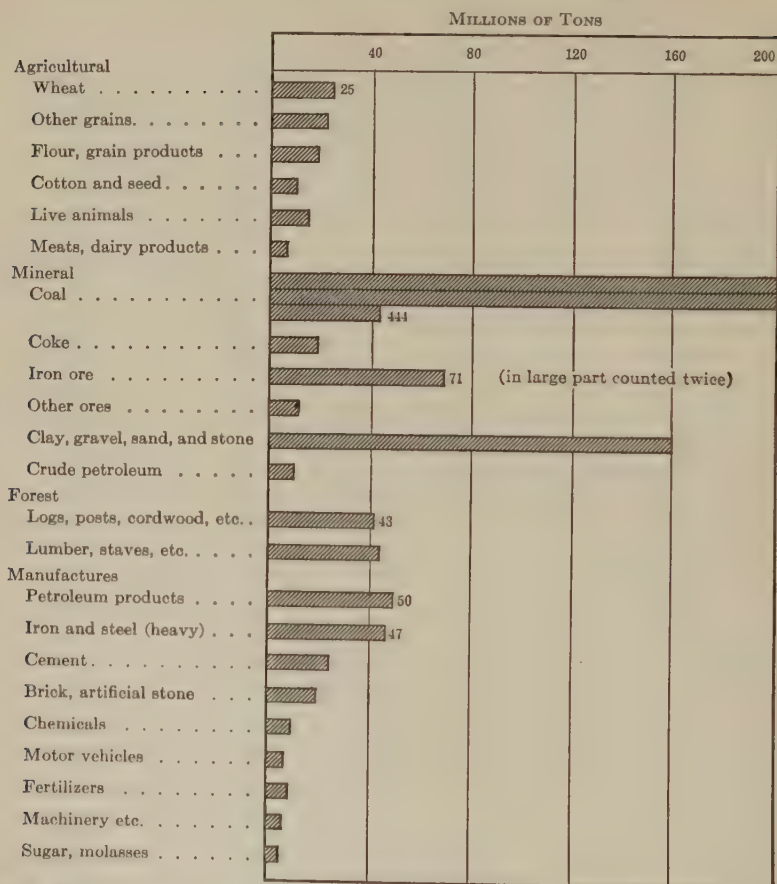


FIG. 80. Diagram showing the average annual tonnage of major commodities carried by American railways

The bars represent the weight of revenue freight (excluding that received from other railways) regardless of length of haul, which varies materially for different classes (see text). The data are means for 1926 and 1927

item is clay, gravel, sand, and stone. In addition to the revenue freight (covered by the statistics here shown) the railways carry great quantities of these materials for their own construction work. Iron-ore traffic, although confined to a few railways, runs into scores of millions of tons. Nonferrous ores and crude petroleum are important commodities of this

group in the Western states, although far the larger part of the petroleum is moved by pipe line.

The group of farm products, which constitutes over one ninth of railway tonnage in the country as a whole and from one fourth to one fifth in the Western division, comprises two subgroups of vegetable and animal products. The former is about four times as large as the latter in weight. The total for this group includes much duplication of freight movement, the raw material, such as wheat or hogs, making one journey (or sometimes two or more) and the manufactured product, such as flour or pork, another. However, the average length of the separate hauls in such cases is probably fully equal to that for most commodities in which duplication of carriage does not take place. Although the wheat crop is much smaller than the corn crop, a far larger part of the wheat is transported, and it is much the biggest item of the group of farm products.

Forest products are very important in the freight business of the South and the West, reaching about 13 per cent of the total tonnage in the latter division. The two principal items are "logs, posts, poles, and cordwood," consisting of crude products, and "lumber, timber, shooks, staves, and head-ings." The two are about equal in tonnage, but on the average the more advanced commodities move much farther.

Practically all traffic of these classes, consisting mainly of crude articles, is transported in carload lots; indeed, whole trains often are made up of a single commodity. More advanced manufactured goods also move chiefly in carloads, but there is a very considerable less-than-carload ("L. C. L.") traffic in them as well. In the country as a whole "manufactures, miscellaneous, and L. C. L. freight" represents over one fourth of the total tonnage, but in the great industrial region of the East the proportion rises to about three eighths. From the standpoint of railway revenue this group is much more important still, since the rates are in general a good deal higher than those on the cruder and cheaper raw materials. In point of tonnage, independently of distance

carried or rates, the largest individual items in this more advanced group are petroleum products and heavy iron and steel articles. Cement and brick and artificial stone rank next. In view of the very high rates per ton on automobiles these no doubt stand among the first three or four items of the miscellaneous group as a source of railway revenue.

One of the noteworthy points of difference between American railway practice and that of most other countries is greater specialization of cars for different commodities. This is brought about to some extent by private ownership of cars. Meat-packing concerns, for example, usually have their own refrigerator cars; oil companies, their own tank cars. The total number of private freight cars is about 288,000 as compared with 2,400,000 owned by the railroads. Under proper supervision the former abuses of this private ownership have been mainly suppressed, and in many ways the practice tends to promote efficiency. Apart from private cars, the railway companies themselves possess a wide variety. More than two fifths of all the cars owned by railways are coal cars, most of them with devices for dumping mechanically. Although box cars (except those equipped for refrigeration) are lumped together in the general statistics, many of them are specialized for such uses as the transportation of automobiles or furniture or horses. Railroad-owned live-stock and refrigerator cars run into scores of thousands. The railroads own eleven or twelve thousand tank cars, but this number is only a fraction of that owned by the oil companies.

This specialization of cars suggests a lack of balance in the direction of freight traffic. An ordinary box car or flat car may carry one class of goods in one direction and another on the back haul; the coal car or the refrigerator car or the stock car is not likely to find any suitable commodity going in the opposite direction. This, however, is the inevitable result of the geography of production. Tonnage of advanced commodities does not, in the nature of things, equal that of crude materials, and the latter, the place of whose production

is largely independent of man's control, cannot be expected to be so obliging as to offer the railways a balanced traffic. As a matter of fact, for every hundred miles the railways haul a loaded car they have to haul an "empty" from fifty-five to sixty miles. There is no way of escaping this expense, and, instead of diminishing, the ratio of empty-car movement to loaded-car movement is gradually rising.

As regards railway passenger traffic the most conspicuous difference between America and Europe, aside from that as to the class system already mentioned, is the far greater use in the United States of sleeping cars and parlor cars. This is due partly to the longer distances, which necessitate much night travel, and partly to the greater income of the people. Perhaps it is chiefly because sleeping cars are so few in Europe that their charges are decidedly higher than in America. Against one "train de luxe" in Europe, there are probably fifty "all-Pullman" trains in America. Although in the United States the extra charge for a sleeping car averages only about one third and that for a parlor car one sixth of the railway fare proper, the receipts of the Pullman Company, which runs nearly all these cars, are equal to about 8 per cent of the revenue of the railways themselves from passenger traffic. It is probable that on journeys of five hundred miles or more over half of American travel is in these cars.

In the United States the conduct of the express business — carriage of small or highly valuable packages either in cars attached to passenger trains or in trains of equally fast schedule — is different from that in most other countries. Elsewhere it is usually handled either by the railways as such or by the postal service. In America there is a specialized express company, the survivor of a formerly considerable number. This company, to be sure, is owned jointly by the railways, but it operates as a separate entity. Indeed, up to 1928 the express business, which for some years had been in the hands of two companies, was not even indirectly owned by the railways.

Although the post office has installed the parcel-post system, which grows rapidly, the express organization has continued to handle a vast and increasing number of packages. It has separate offices for receiving and delivering goods, and fleets of motor trucks for terminal movement. The annual receipts from express business in recent years have been nearly \$300,000,000, or not far from half as much as the government takes in for all branches of mail service combined. The feature which distinguishes the service from that of most freight is that packages are carried from the door of the shipper to that of the receiver. The recent transfer of control to the railway companies is expected to lead to a general extension of the practice of delivering less-than-carload freight to the door of the consignee, a method made the more desirable by reason of the increasing competition of motor trucks in intercity freight traffic.

SECTION 5. PROGRESS OF THE RAILWAYS

The freight traffic of the American railways in 1928 was nearly fourteen times as great as in 1880 and three times as great as in 1900. The growth has far outstripped increase in population, and materially exceeded the increase in the aggregate production of commodities. Compared with these earlier years, passenger traffic has also grown much more than population, but owing to the immense increase of automobile transportation it has fallen off since the close of the World War. The significance of railway development as a mirror of general economic progress must be judged by movement of freight alone.

Down to about 1910 railway progress took the double form of extension of lines and intensification of their capacity and use. Since that time intensification has dominated. The railway net had then reached adult stature; its chief need was girth. The first task of the railway had been to tie together established communities; the second, to push out into the empty spaces; the third (a reversion, in a sense)

was to provide more adequately for the swiftly expanding industries of the localities already connected up. Throughout railway history traffic has grown far more than mileage. This is partly a result of the famous "principle of increasing returns," or the possibility, once a railway is laid down, of hauling more cars over it without correspondingly adding to

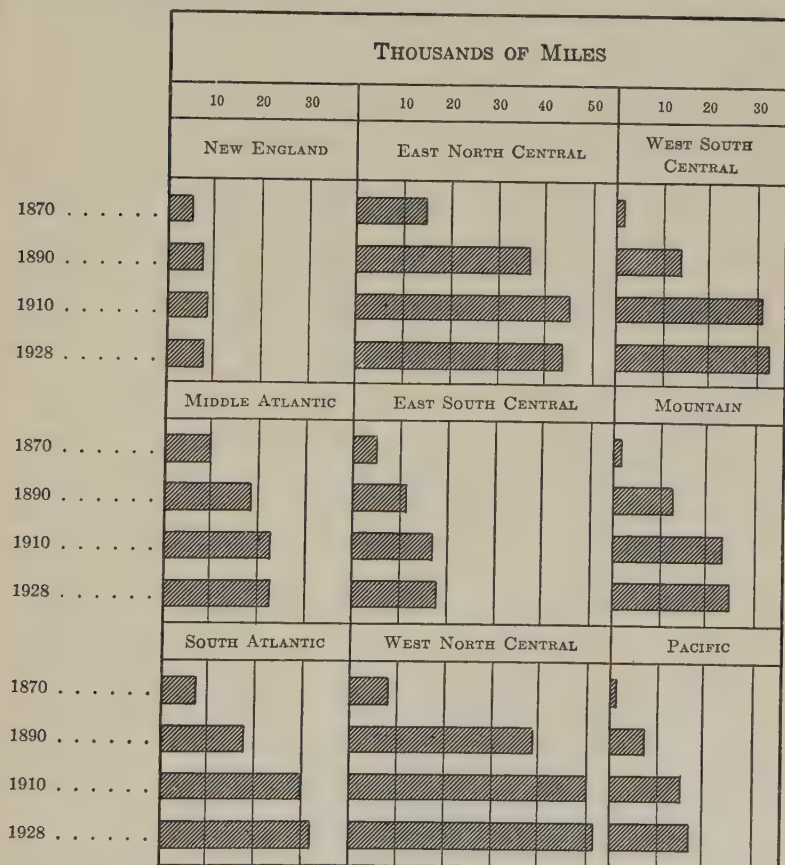


FIG. 81. Diagram showing the growth of railway-line mileage in the several geographic divisions since 1870

For states covered by each geographic division see map on page 307. Although in several divisions there has been little or no increase in length of line since 1910, the length of track, including double and multiple tracks, sidings, and yards, has increased throughout the country

investment. It has been due largely, however, to improvement of facilities involving heavy capital expenditures.

The railway began to replace the lumbering van, the stage-coach, and the canal boat just about a century ago. By 1850 there were 9000 miles of line, less than half a mile for each thousand inhabitants. Thereafter the shining rails sped swiftly, spinning their web all over the East, racing past the Great Lakes and out into the prairies, and at last spanning the whole vastness of the continent. By 1880 there were over 90,000 miles, nearly two miles for each thousand people. The mileage more than doubled again in the next twenty years, and even during the first decade of the present century railway-building outstripped growth of population. By 1910 there were 2.6 miles per thousand inhabitants. But the goal had then been reached; nearly every community had its iron way, and further increase in inhabitants and industries sought not empty places but established centers. Fig. 81 shows the growth of railways in the several geographic divisions.

Railway extension practically ceased fifteen years ago; but not so railway investment or expansion of capacity. Long before that time the railway companies had begun to make great improvements on the existing lines. In recent years the process has been speeded up. Since 1907 approximately \$12,000,000,000 have been laid out as capital, not taking into account large sums for betterment charged to operating expenses and not added to capital account. The average investment per mile of line rose from \$62,000 in 1907 to nearly \$100,000 in 1927. The entire cost of a new railway, in case it does not need to provide for heavy traffic, is often no more per mile than has been added to the investment in the older lines.

One of the easily measurable forms of railway improvement is the addition of trackage on existing lines (see Fig. 82, *B* and *C*). Double-tracking much more than doubles capacity. More and longer side tracks add greatly to the ability of the single-track system to handle traffic. Additional yard tracks, especially at the great terminals, expand what tends

to become the neck of the bottle. The 259,000 miles of line now have about 170,000 miles of additional track.¹ The ratio of other tracks to first main track has risen from 28 to 100 in 1890 to 65 to 100 in 1928. Double-track or multiple-track main lines have increased from 6 per cent of the total railway mileage to 15 per cent.

Quite as important as additional tracks in increasing carrying capacity have been improvements of roadbed. Curves and grades have been made more gentle, and distances shortened; often this meant throwing great bridges across valleys and streams, driving deep cuts through hills, piercing mountains with costly tunnels. Formerly trains had to make a long detour round the Great Salt Lake; now a cut-off costing many millions, but saving many more by shortening the distance fifty miles or more, strikes straight through that remarkable body of water. Recently the famous Moffat tunnel, piercing the Continental Divide near Denver, has lowered by several thousand feet the elevation to be surmounted by another important railway, with a great reduction in time and in operating expenses. Another of the transcontinental lines has just driven a great tunnel through the Cascades in Washington, with similar advantage in operation. Scores of such instances might easily be cited. The roads have been made more solid too, by better ballast, better ties, heavier rails, and more massive bridges. Much progress has been made in eliminating grade crossings, although a great deal remains to be done in this direction. Passenger service has been facilitated by commodious stations, often of gigantic proportions and noble architectural style; in many cases the approaches to these terminals have involved enormous expense.

On the roadbed thus improved bigger and stronger locomotives and cars have been put to work. The average tractive power of a locomotive only as far back as 1905 was under

¹ These figures are based on reports of mileage operated by individual companies, the total somewhat exceeding the actual existing mileage owing to cases of joint operation over the same track.

24,000 pounds; today it is about 44,000. The average size of freight cars has increased by half in the same period. Better roadway and better rolling stock have added greatly to the carrying capacity of the railroads. Each mile carries three and a half times more freight than in 1890. This would have meant intolerable congestion had the methods of operation remained unchanged: the trains would have piled up on one another. But trains are now four times as heavy as then. The number of trains passing over a given stretch has thus not increased at all, and the greater length of the individual train has no important tendency to overcrowd the lines, in view of the longer sidings and yard tracks. (See Fig. 82, *E*, *G*, *H*, and *J*.)

The great increase in traffic per mile of line and per train has reduced unit costs of operation. Station employees at smaller points no longer have half their time on their hands. It takes scarcely more men to run a long and heavy train than it does to run a light one. The average amount of freight handled (ton-mileage) per railway employee has about doubled during the last three decades (Fig. 82, *I*). Straighter and more level tracks have lessened the power required. More efficient locomotives have cut down the consumption of fuel. The railways on the average use about one fourth less coal to move a ton of freight than they did only ten years ago.

The trend of railway rates, so far as it can be determined from the average revenue per ton per mile of freight, is shown in Fig. 82, *K*. From the middle nineties down to about 1916 the prices of commodities, as reflected in the general wholesale-price index, rose greatly, whereas the average revenue per ton per mile tended slowly downward. The war period, with its government control of railways and the abnormal ups and downs of prices, wholly distorted the relationship of rates to prices. When the railways were restored to the companies a general increase in rates was authorized. Since then some reductions have been made, but the average per ton per mile has varied little since 1923. At the present time

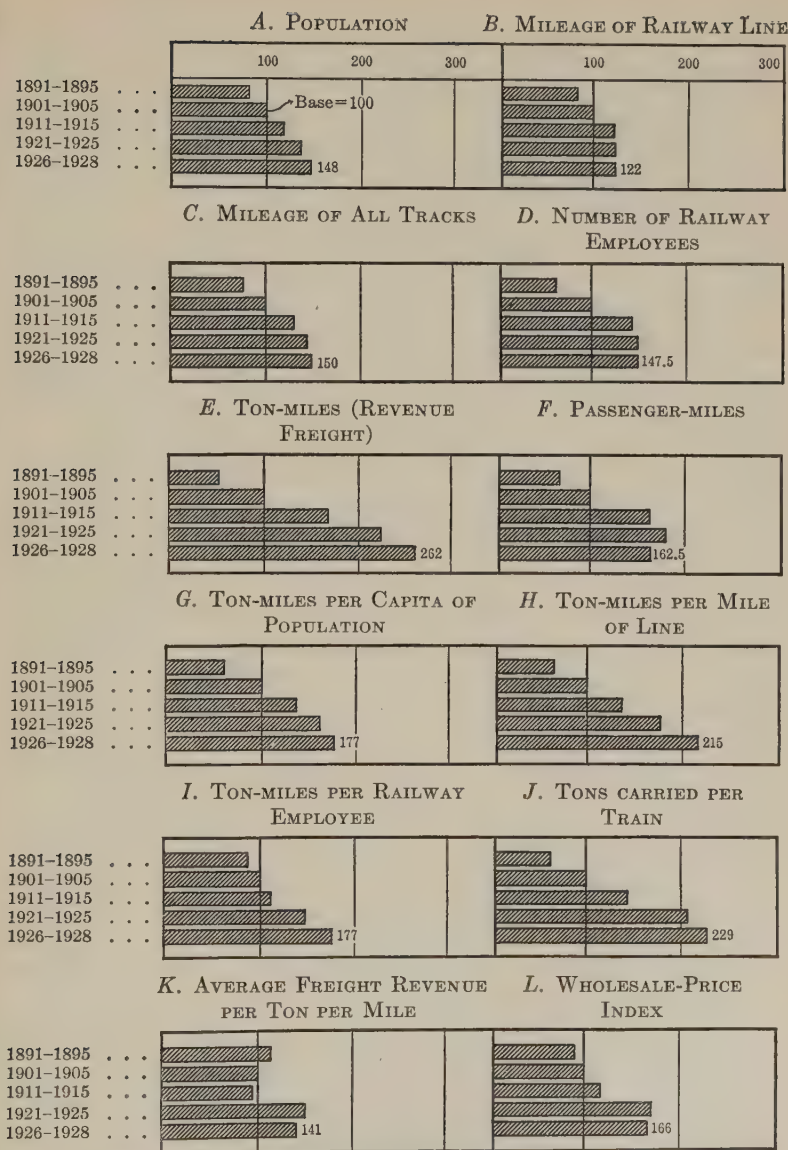


FIG. 82. Diagram showing changes in railway mileage, number of employees, traffic, and average freight revenue per ton per mile

The bars all represent relative numbers, comparing the annual averages for the several periods with 1901-1905 taken as 100

the average freight charge per ton per mile is about 25 per cent higher than during the period 1891-1895, whereas wholesale prices are nearly 90 per cent higher. On the other hand, the average revenue per ton per mile shows considerably greater advance over the immediate prewar years than do wholesale prices. This is partly the result of a change in the composition of railway traffic. The ton-mile average for all commodities combined comprises widely varying charges on different commodities. Since prewar days there has been much greater expansion of traffic in manufactured goods, which command relatively high rates, than in crude products at low rates. A further explanation of the advance in rates is the fact that the wages of railway employees have increased somewhat more than those of most other workers.

The shippers and receivers of freight as well as the railway companies have felt during recent years that better service was more important than lower rates. The tremendous pressure of traffic during the war and the necessity of holding down expenses resulted in deterioration of roadbed, locomotives, and cars. For two or three years after the armistice the quality of service was radically unsatisfactory. The railways then went hard to work, individually and collectively, to remedy the situation. Groups of shippers, systematically organized by regions, on their part agreed to load and unload cars more promptly, to refrain from calling for more cars than were actually needed, and to furnish in advance to the railways estimates of the car requirements of the locality or region over a period of time.

The results of this effort have been remarkable. Eight or ten years ago a quarter of all the locomotives were out of order; at present the proportion unserviceable has been reduced to one sixth, which is considered almost the irreducible minimum. The proportion of cars in bad order has been cut down from 12 or 15 per cent to about 6 per cent. The average distance covered per freight car per day has been raised from twenty-three and one-half miles to thirty-one. Formerly the average daily shortage of cars — excess of

calls for cars from shippers over the number actually furnished — ran into scores and even hundreds of thousands; at present practically every demand is met without delay. Freight trains move much faster and keep much more closely to schedule time. It is estimated that the average time of movement over a given distance is about one third less than just after the war. This improvement in freight movement is having far-reaching effects on the whole conduct of manufacturing and commercial business. Since goods can be moved with certainty and speed, less piling up of stocks is necessary. This not merely lessens the cost of doing business but also cuts down risks of producers and sellers and serves as a powerful safeguard against sudden shocks that might develop into serious crises. The phrase "hand-to-mouth buying" may suggest lack of forethought, but the practice, if wisely pursued, spells economy.

Ever since the railways began to play a part in American economic life their progress has been intimately tied up with the general advance of industry and of standards of living. Because production increased, more traffic was offered, and this helped to reduce operating costs and fixed charges per unit handled. Conversely, the strengthening of the carrying capacity of the railways opened wider and wider avenues for industry. Raw materials of low grade or from distant sources which without cheap transportation would have lain unused have been brought into service. Huge factories have been concentrated where conditions are most favorable, because the railways are ready to carry their output to remote markets. Railway service, constantly improving, has given the masses access to foods that a few decades ago only the rich could afford. Trains of skillfully designed special cars are moved at high speed to bring to the city dweller fresh milk, butter, meat, vegetables, and fruits from farms, gardens, and orchards hundreds or thousands of miles away. It is difficult to conceive how the picture of the life of the American people would appear today had there been no such mighty agency of transportation.

SECTION 6. ELECTRIC RAILWAYS

In large cities transportation of persons, in great masses and at reasonably rapid speed, is an essential both for economic efficiency and for the maintenance of a decent standard of living. Since the big city is an indispensable feature of highly developed industry and commerce, urban transportation becomes a matter of more than local significance. Despite the great expansion of motor traffic the electric railway is still a major transport agency in every American city, if not the dominant one. The electric line is also a highly important factor in suburban and interurban passenger movement, though in this field it is decidedly losing ground, not only relatively but absolutely.

Electric railways — not including electrified sections and terminals of railroads operated primarily by steam — have over forty thousand miles of track and carry annually about twelve billion passengers, not including transfer passengers. The receipts are about \$1,100,000,000 annually, or considerably more than the steam railways take in from their passengers. There are no statistics of mileage traveled, but unquestionably the average fare per mile is materially lower than on the steam lines. This is made possible by the great density of traffic, electric trains and cars often following one another with bewilderingly short "headway" and being normally, in the rush hours, packed to the limit of endurance.

American cities not only add swiftly to their population, but, owing to the insistence on better housing, most of them expand even more rapidly in area covered. The shifting of business centers and the spreading out of mercantile and office buildings have served only to palliate the ever increasing pressure of traffic. The electric car is capable of high speed, but the conditions of operation in cities present grave obstacles to swift movement. The necessity of taking on and discharging passengers at short intervals, the narrowness of the streets, the congestion of other traffic, and the overpressure during the rush hours of morning and of late

afternoon all make the way of the street car perplexing. The problem has been attacked in various ways: by larger cars, by limiting the number of stops for certain cars or on certain lines, and, in several of the larger cities, by overhead or underground construction. The subways of New York have become a gigantic undertaking already involving investment of hundreds of millions of dollars. In the country as a whole elevated railways and subways carry some two billion passengers yearly, or about one eighth of the combined total for all electric lines.

There was a time two or three decades ago when it seemed that electric railways would come to play a dominant part in middle-distance passenger transportation to suburbs and between towns and cities. Interurban lines were multiplying and gaining in popularity. Traffic of this sort is still large, but the motor car has stopped its growth and in a good many cases even driven the electric railways on the financial rocks. It is impossible to distinguish in statistics between strictly urban and longer-distance movement, so that the actual extent of the changes in the latter cannot be determined.

Most of the electric railways in America are run by private corporations, though a very few are operated by municipalities. The subways in New York and one or two other cities have been aided by public credit. Within any given city electric transportation is usually the monopoly of one concern, experience having shown the futility and inconvenience of attempted competition. Fares within city limits are ordinarily "flat," that is, uniform regardless of distance, with sometimes an additional charge for transfer to another line. In many if not most European cities the electric railways are operated by the municipal government. For the reason that foreign cities (at least on the Continent) are more compactly built than in America, and for other reasons, the electric-railway business is much smaller than in places of corresponding size in the United States.

The electric car burst into the transportation firmament only forty years ago. Before this time cities had put up with

the painfully slow and dismal horse car and with a few cable and steam systems. The new method of traction soon virtually banished all others and developed a magnitude that they could never have attained. By 1912 there was five times as much trackage of street railways (including interurban lines) as in 1890, the number of passengers carried had increased in almost equal ratio, and the average length of journey was much greater. The increase in traffic between 1912 and the present time has been about 25 per cent, or decidedly less than the growth of urban population; for several years past there has been a slight falling off.

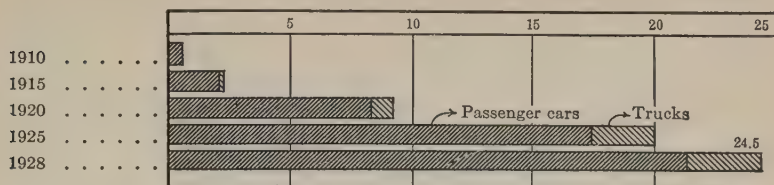
SECTION 7. STREETS AND HIGHWAYS; MOTOR VEHICLES

Highways have taken on a wholly new significance since the advent of the automobile. There is no way of measuring their importance statistically. The peculiarity of the highway is that it is everyone's way, not a line of track or of wire over which a single concern operates. The private motorist or truck-owner cannot be expected to report the movement of his car, much less the value or the cost of the service. It is obvious enough, however, that the highway carries today a very large traffic in goods and a passenger traffic of proportions no less than colossal. In city and country alike swift-moving motor cars crowd the roads and streets.

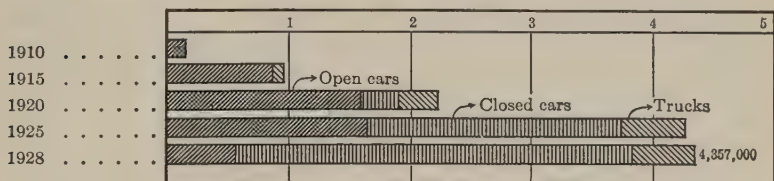
Reference has been made in several earlier chapters to the immense use of motor vehicles in the United States. The major facts are recapitulated in Fig. 83. The number of motor cars has risen from a few thousands at the beginning of the century and less than half a million in 1910 to more than twenty-five million in 1929.¹ Even in the short period since the close of the war the number has much more than trebled. More than three fourths of all the motor cars of the

¹ Motor cycles are not included in the diagram or in any statement made in this section. The number in use in the United States has declined and is now only about 120,000.

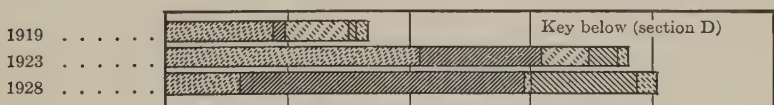
A. REGISTRATION OF MOTOR VEHICLES (UNITED STATES), IN MILLIONS



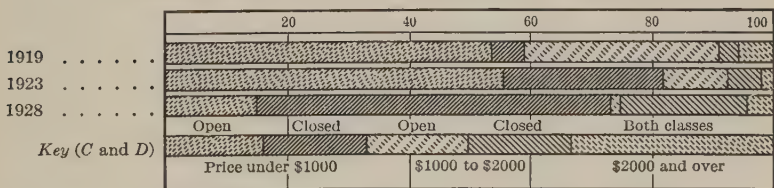
B. PRODUCTION OF MOTOR VEHICLES (UNITED STATES), IN MILLIONS



C. PRODUCTION OF PASSENGER CARS (UNITED STATES AND CANADA), IN MILLIONS



D. PERCENTAGE OF TOTAL PRODUCTION OF PASSENGER CARS



E. NUMBER OF MOTOR VEHICLES PER 1000 INHABITANTS

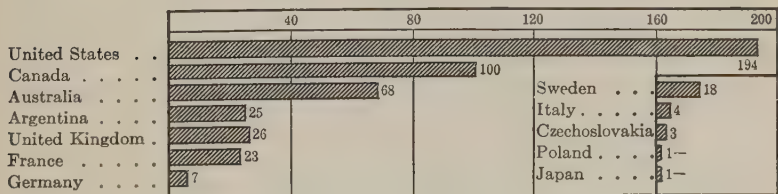


FIG. 83. Diagram showing the registration and production of motor vehicles

None of the figures include motor cycles; in the United States the number used is insignificant, but in some foreign countries it is relatively large. The shift from open to closed cars is conspicuously shown. Section E relates in most countries to January 1, 1928

world — passenger cars and trucks, excluding motor cycles — are found in this one country. Its annual output of new cars is an even larger proportion of the total, for American cars are widely exported over the world. About one sixth of the current production is shipped abroad, a number equal to or greater than the total output of all Europe. In proportion to population more cars are registered in the United States than in any other country; the ratio is several times as high as anywhere else, with the exception of the great English-speaking dominions of Canada, Australia, and New Zealand, and many times as high as in the great majority of nations.

American production of cars tends upward notwithstanding that a large majority of the families of the country already possess one or more cars. The output in 1929 was greater than ever before and about 150 per cent more than in 1920. The saturation point, of which much was said a few years ago, is apparently a myth; in any case, the high buying power of the people enables them to replace their cars with new and better ones at intervals so frequent as to constitute a great demand in addition to the demand from new users. A significant indication both of the high standard of well-being among the people and of the more constant and practical use to which automobiles are put is afforded by the dominance of closed cars in the production of the last few years. Whereas as late as 1919 not one car in ten of those turned out was closed, the proportion in 1928 was 83 per cent, and many of the open cars now manufactured are expensive sport models which are sold to families that possess also closed cars. It is this shift to the closed car, together with the constant improvement of motor vehicles in efficiency, durability, equipment, and appearance, that has during recent years prevented a decline in the average unit price of all the cars produced. Were it the practice to retain models essentially unchanged for long periods, the increase in the efficiency of manufacture would have caused a marked fall in prices. The thousand-dollar car of today is in most

respects a better vehicle than the one that cost half as much again only a few years ago. Owing to the increased use of cars in winter and in all sorts of weather, made possible by the closed car, the average mileage traveled per year per car has risen materially.

Along with the growth of motor traffic in America has gone the vast construction of good roads. Twenty-five years ago most of the countries of Europe could boast better rural highways than the United States; today, however, there is none that can compare with it. Every grade of government has coöperated. Townships, counties, states, and the nation have all supplied funds, and supervision by state authorities and by Federal experts has served to standardize roads and to reduce construction and maintenance costs. The length of surfaced, or "hard," rural roads — ranging from massive concrete and asphalt to macadam and gravel — now totals over 600,000 miles (589,000 at the beginning of 1928), or four times as much as a quarter of a century ago. The mileage is growing at a rate of from 30,000 to 50,000 miles per year. Some 65,000 miles of the roads outside of cities and towns are paved; twenty years ago there were practically no rural roads of this enduring type, — a type that has more and more been found necessary to stand the heavy and fast traffic. The annual expenditure for construction and maintenance of rural highways is about a billion and a half dollars, a sum larger than the total budget of any national government of the world, barring some half-dozen great powers. In the meantime there have been marked improvements in city streets, also necessitated by motor traffic.

The "passenger mileage" of automobile travel in the United States can be estimated only very roughly from the number of cars, the approximate average distance that each covers yearly, and a mere guess as to the average number of persons carried in a car. The total lies somewhere between 250,000,000,000 and 400,000,000,000 miles,¹ a stupendous fig-

¹ As to the almost astronomical magnitude of these figures compare the statement regarding ton-mileage of freight on page 517.

ure, to be compared with about 32,000,000,000 for the steam railways and probably 50,000,000,000 or 75,000,000,000 for the street and electric railways. Motor-car traffic within cities and towns, suburban and rural traffic, and long-distance traffic have all reached huge proportions. Business and pleasure alike use the motor car: the farmer on his trip to town, the merchant, the clerk or the mechanic on his way to work, the salesman on his round of "prospects," the housewife in her shopping, the family on its evening or Sunday outing, the tourist wandering afar, the youth with his sweetheart. Some of this travel represents a diversion from the existing steam railway or the street railway; some of it would have been cared for by construction of new steam or electric lines; some, of course, has merely replaced movement by horse-drawn vehicles, with the advantage of greater speed and comfort. The major fraction, however, is the creation of the motor car itself, — travel that without it would not have taken place at all. How much of happiness and health, and of business too, this new traffic has brought to America is a calculation that lies outside the realm of the statistician.

In the movement of goods the highway and the motor car play a less important part but nevertheless one of great economic significance. The motor truck has very largely displaced the horse vehicle both on city streets and on country roads. Because roads and streets have been greatly improved, and because of the inherent efficiency of the motor, the change has lowered costs in time and money and has increased local movement of commodities. The farmer, the merchant, the contractor, and the manufacturer have gained. To a considerable and growing extent motor trucks are coming into use for relatively long hauls. Part of this traffic represents, in a sense, diversion from the railways. So far as actual transportation is concerned the truck is more expensive than the train. The greater part of railway traffic is of heavy commodities where the rails directly reach the plant or the warehouse of both shipper and consignee, and such

traffic is scarcely threatened by motor-truck competition. In other cases, however, the truck can take household goods or merchandise direct from the shipper's door to the receiver's, where shipment by rail or water would involve, in addition to the major haul itself, truck carriage at both ends, with two additional handlings of the goods. There are also cases where the truck is able to create a movement of goods that otherwise would scarcely take place at all. It reaches communities that have no railway service, or affords a short route between points which have only a roundabout connection by railroad or waterways.

Most motor-vehicle traffic, both passenger and freight, is of a private character. There is, however, a considerable and rapidly growing public-carrier business by taxicabs, busses, and trucks carrying for hire. This traffic is both local and interurban; some of the bus and truck lines cover hundreds of miles, and even span the continent. Many of the modern busses are of great size and finely equipped; on country roads they make speeds comparable with those of interurban electric railways and of the local trains of steam railways. As yet information as to the magnitude of this public-carrier business by motor vehicle is very imperfect. It is beginning to be subjected to the control of state or even national authorities. No doubt in some cases the competition of bus and truck lines has injuriously affected the steam and electric railways, though often they are essentially noncompetitive. Many electric railways, of both the urban and the interurban type, have themselves established bus lines instead of extending their tracks; in 1927 their busses covered over 130,000,000 miles and carried nearly 400,000,000 passengers. Notably in New England the steam railways have adopted the same policy. Similarly, the steam railways in a number of localities are using motor trucks to replace or supplement short-distance freight traffic or to serve as feeders for their trains.

The future of American highway traffic may be affected somewhat by the supply of petroleum, but there is little

reason to doubt that it will continue to expand rapidly for an indefinite period. We shall witness further multiplication of good roads and the widening of existing roads. One limiting factor is the risk from crowded traffic and high speed. "Where shall I park my car?" will remain a big question. It is possible that the ultimate outcome will be a radical transformation of the whole "layout" both of business and of the housing of the people. The line of demarcation between town and country, already growing less sharp, may largely disappear, and the centers of cities may take on an altogether novel constructional character.

SECTION 8. WATER TRANSPORTATION

Nations that "go down to the sea in ships," like individuals who do the same, meet romance, adventure — and sometimes disaster. American water transportation has perhaps had more than its normal share of trouble. One cannot begin a discussion of it with any such highly cheering comparisons with other countries, or with the past, as in the case of most other American economic activities.

The ship presents two distinguishing features: (1) in deep water it is by far the cheapest method of moving goods; (2) it moves commonly (not always, of course) on ways provided by nature and not constructed by man. The first characteristic is in part the result of the second. Efficient as are American railways, it costs 60 or 70 per cent more to move iron ore a little over a hundred miles from Lake Erie to Pittsburgh by rail than to carry it some eight or nine hundred miles from Duluth to Cleveland by vessel. The rail rate on grain from Chicago to New York (for domestic consumption) is normally about double the rate by steamer from New York to Liverpool, four times as far. Even if the railways had no fixed or maintenance charges on their lines to pay, their rates could not begin to compete with those of ocean freightage. Quite different is the case where the vessels must use shallow, tortuous channels with swift

current, and especially if the waterways must be created or remade and maintained at heavy expense.

The high sea means the free sea. Over nature's broad waters any man's ship may navigate, unless some man-made law or practice says him nay. Competition is as natural in water transportation as it is unnatural where the way itself belongs to an owner. The United States, like many other countries, permits only the vessels of its citizens to traffic between one national port and another, but among those citizens competition is free. The international movement of vessels is very seldom subjected to restriction save in time of war.

Water transportation naturally falls into four main classes : (1) Foreign commerce, in which the United States has encountered much difficulty. (2) Coastwise commerce, in which it has done very well. (3) Internal commerce by deep natural waterways ; in this field it has scored high achievement. (4) Internal commerce by other waterways, chiefly rivers and canals, in which again it has thus far accomplished relatively little.

The total volume of American water-borne traffic is very large. Including all the classes mentioned above, and counting foreign commerce both outward and inward, but not reckoning purely harbor traffic (lighterage and the like), the freight moved from one port to another totals about 450,000,000 tons annually, or over one third as much as is handled by the railways. There is no adequate record of ton-mileage, but it is probable that for water carriage the average distance is considerably longer than on the railways, including as it does transoceanic traffic, coast-to-coast movement through the Panama Canal, many long voyages along each coast, and heavy movement from Lake Superior to the lower lake ports. The average length of movement on the rivers and canals, however, is relatively short. Independent of distance, the cargo movement between ports in 1927 was divided approximately as is shown in the table on the following page.

	MILLIONS OF TONS
Foreign trade	
Overseas, both directions	100
With Canada via the Great Lakes, both directions	20
Coastwise traffic	
Through the Panama Canal	11
Other	110
Great Lakes (domestic traffic)	114
Rivers and canals, excluding mere connecting traffic covered above	138
Gross total, about	493
Deduct duplication among the several classes of waterways	38
Net total of traffic between ports, about	455

Ocean-borne Foreign Transportation

The American flag has passed through great vicissitudes in merchant trade on the high seas. The Yankee clipper ship, with its proud-swelling canvas, was once the peer of any ocean carrier. United States vessels not only carried the bulk of American exports and imports, but performed much service for other countries. About the time of the Civil War there began a rapid decline. That war itself checked the building and operation of American ships. The character of ocean vessels was fast changing. Steam swept away sail; iron drove out wood. England, then far ahead of the United States in the iron industry and in manufacturing industry in general, and forced to maintain the biggest and most efficient navy in the world, naturally took the lead in construction both of hulls and of marine engines. More important still in the operation of ships, the rising wages of American labor made competition against other countries, with lower-paid seamen, constantly harder to maintain.

Between 1860 and 1880 the tonnage of American vessels engaged in foreign trade was almost cut in two, although population, imports, and exports were rapidly growing. Even the tonnage engaged only in domestic trade showed no increase during this period. In the next thirty years the foreign-trade shipping fell still farther till by 1910 only about one tenth of the export and import trade of the country was

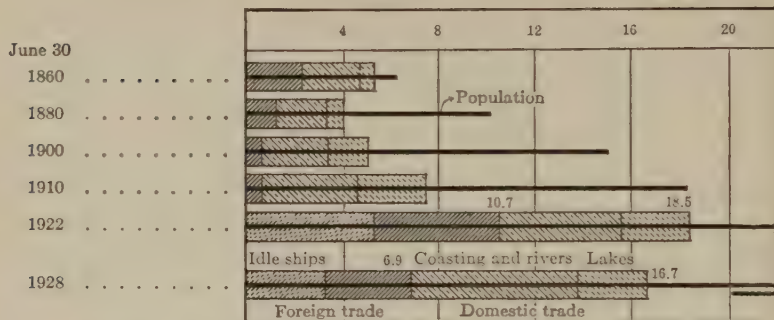
carried in American bottoms.¹ However, during these three decades the capacity of the fleet in coastwise and lake trade had multiplied two and a half times. In 1860 nearly half the American merchant marine was engaged in foreign commerce; in 1910, hardly the tenth part (see Fig. 84).

The war and postwar experience of the United States in shipping is too well and painfully known to require more than a bare summary. With German submarines sinking vessels almost daily and threatening to cut off America's war associates from food and basic necessities, it became the nation's duty to build ships and ever more ships. The Treasury poured out millions like water. With the immense capital resources of the country and with the quick adaptability of American enterprise, new shipyards were built and vessels constructed at a speed never before approached in the history of the world. When the armistice came, there were hundreds of vessels on the ways. Contracts could not be instantly canceled, and scores of thousands of workers be suddenly thrown out of jobs. Moreover, it seemed needless waste to leave half-built ships unfinished. Hence work kept on for a year or two till the American foreign-trade tonnage reached (at least on paper) a maximum of eleven million tons, or fourteen times the figure for 1910. The United States had an ocean-going merchant fleet over half as great as that of England, century-long mistress of the seas.

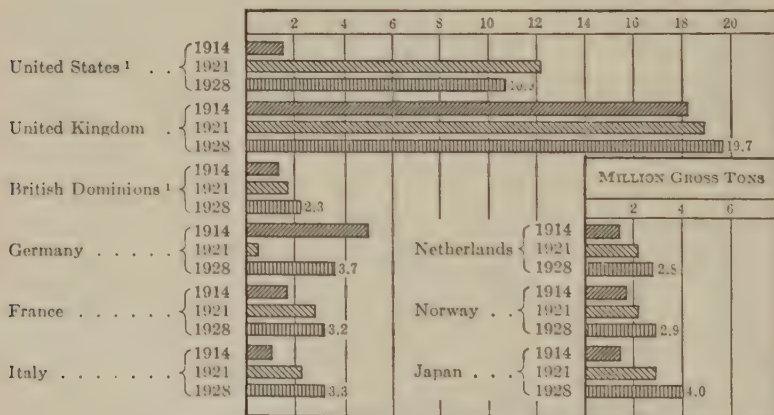
After the short postwar trade boom came stagnation. The huge war traffic had ceased. The world's foreign commerce was much less than before the great conflict. Moreover, the new ships built in America were mostly unsuited to compete under peace conditions. To save time, great numbers had been built essentially alike, whereas specialized types are needed for the ordinary conduct of trade. Besides, a considerable part of the work had been of quality good enough for emergency but not for permanent operation. Once more, too, the high wages of American seamen stood in the way of

¹ As measured by value. Value is a basis less satisfactory than that of weight, but data covering early years are not available for weight.

A. CHANGES IN THE AMERICAN MERCHANT MARINE, IN MILLIONS OF GROSS TONS



B. STEEL STEAM AND MOTOR VESSELS OF PRINCIPAL COUNTRIES, IN MILLIONS OF GROSS TONS



C. METHOD OF CARRIAGE OF AMERICAN FOREIGN TRADE

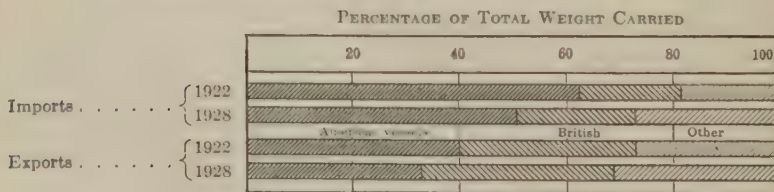


FIG. 84. Diagram showing statistics of shipping

In Section A the scale for population is not stated on the diagram. The bars indicate tonnage idle during 1922 and 1928; most of this is registered for foreign trade

¹ Excludes American and Canadian vessels on the Great Lakes.

competition, and the laws forbade the employment of foreigners to run American ships.

The government owned the new vessels, and it found difficulty in selling or leasing them to private operators. It ran lines itself as best it could — the job is one peculiarly unfitted for conduct by government. Half the ocean-going fleet long lay idle. As a result of sales of ships to foreigners, of dismantling, or of transferring to coastwise service, the tonnage registered for foreign trade fell from 11,000,000 in 1921 to 6,900,000 in 1928; but even of this reduced total more than two fifths is tied up and rusting to worthlessness. The share of the exports and imports carried under the American flag has dropped sharply. Although at the maximum point, in 1921, the fleet had capacity enough to carry all the trade, it then carried only 71 per cent of the imports and 38 per cent of the exports (weight, not value). By 1928 these proportions had fallen to 51 per cent and 33 per cent respectively. It may be noted that the reason why the percentage is higher for import trade than it is for export trade is that the former includes an immense tonnage of petroleum from Mexico and South America, largely produced by American-controlled wells and largely transported by American tankers; the vessels in this trade go back without cargo.

The merchant fleets of several other nations have been expanding during recent years while that of the United States was declining. England, to be sure, has gained little. But Italy and Japan have now two or three times as much ocean-going tonnage as before the war; France, the Netherlands, and Norway have added greatly to their shipping; Germany, which lost nearly all her vessels by capture or as the result of the peace treaties, has been building with might and main and had in 1928 four fifths as much capacity as in 1914. The new ships of these countries are of modern type; a great proportion are driven not by steam but by internal-combustion motors. Even on paper American ocean-going shipping (including that in coastwise trade) has fallen from 23 per cent of the world's total in 1921 to about $17\frac{1}{2}$ per cent;

in practical use the fleet represents a still smaller proportion. The picture, however, has begun to improve in the last year or two.

The government still owned at the end of 1928 about three fourths of the American shipping registered for foreign trade, but more than half the government vessels were idle; the weight (independent of distance) of the foreign traffic carried by privately owned American ships has been in recent years several times that handled by Shipping Board vessels, the ratio increasing year by year. The government has no desire to remain in the business, but it is loath to discontinue certain services which private capital has not yet shown a willingness to undertake. The Jones-White Act, of 1928, providing for mail subventions and loans for ship construction, is aiding greatly the position of the United States in ocean shipping. The ultimate outcome, subject as it is to possible effects of new legislation, can scarcely be foreseen. The most conspicuous of the government-owned ships, those of the United States Line operating in passenger service to Europe and including the giant *Leviathan*, were sold to a private concern early in 1929.

Coastwise Transportation; the Panama Canal

One of the most notable features of American transportation in recent years is the rapid increase of coastwise traffic. Important factors in this development have been the swift rise in the output of petroleum, great quantities of which are moved by water from Gulf ports to the North Atlantic coast, and the opening of the Panama Canal, which is now carrying a heavy intercoastal traffic.

The tonnage of vessels registered for coastwise trade (not counting that on the Great Lakes), after declining somewhat from 1910 to 1920, has since much more than doubled. The weight of cargo carried between coastal points has increased greatly and is now larger than that on the Great Lakes or than that of ocean-borne foreign trade. The number of vessels

engaged in coastwise traffic is, in round figures, ten thousand (excluding small boats) and their capacity is approximately seven million gross tons. Although there is some passenger traffic along the coasts, especially in summer, and a considerable movement of so-called package freight (mixed merchandise in small lots), much the greater part of the coastwise trade consists of bulk freight — relatively cheap products usually transported as entire cargoes of one commodity. For such goods ships often make as good time as railway trains, and the costs are much lower. Vessel transportation is particularly economical where distances are long, inasmuch as loading and unloading are a large element in cost. However, short movements, especially within protected bodies of water, such as Chesapeake Bay and Long Island Sound, are of no small importance; in a good many cases water gives access to points hardly reached by rail service.

Among the important movements of bulk freight along the American coasts may be mentioned that of coal from Hampton Roads, Baltimore, and Philadelphia to New York, New England, and elsewhere, totaling about twenty-five million tons annually; that of lumber, petroleum, and cotton from Gulf ports to the North; that of lumber and petroleum from the Pacific coast to the Atlantic coast; and that of lumber along the Pacific coast itself. Most of the heavy coastwise freight moves eastward and northward; there is no balancing of the traffic in the opposite direction. Thus in the case of coast-to-coast business through the Panama Canal the cargo from west to east is three or four times the reverse movement.

The Panama Canal, begun by French enterprise, but carried through in the face of great difficulties only by the vast resources of the American government and the skill of American engineers, has abundantly justified its existence. Shortening by several thousand miles the distance from the eastern shores of the United States and from Europe to the west coasts of the two Americas and to the Far East, the Canal has become the highway of a great commerce.

It was opened in 1915. Since 1919 the traffic has more than quadrupled. Each year over six thousand ships pass through the Canal, carrying in the neighborhood of thirty million tons of cargo, with a saving of transportation costs — as compared with other routes — running into tens of millions of dollars.

Approximately half the cargo moving through the Panama Canal is carried by American ships ; the bulk of their traffic is between the two coasts of the United States itself (in which trade foreign ships are excluded), but not a little is bound to or from South America and the Far East. Including all traffic by vessels of all flags, the weight of cargo from Pacific to Atlantic is about two and one-half times that in the opposite direction, for the reason that bulky raw materials come from the Pacific shores, whereas the east coast of the United States, and Europe as well, send to those shores lighter, fabricated articles. Of this Pacific-to-Atlantic trade about two thirds comes from the west coast of North America and most of the remainder from South America, leaving a relatively small amount originating in Asia and Oceania. On the other hand, in the westward movement Asia and Oceania as destinations take together a far larger part of the Canal traffic than South America and three fourths as much as the west coast of North America. With the vast population of Asia and the high buying power of Australia and New Zealand, the Far Eastern market for manufactured goods is much larger than that of the western countries of South America, and the western coast of North America gets its goods of this sort largely by rail.

Lake Transportation

It is a rare good fortune for both the United States and Canada that between the Northwest, with its millions of acres of wheat lands and its unrivaled iron-ore deposits, and the Eastern centers of population and industry stretches the finest body of fresh water in the world. With only moderate expense for improvements — especially the canals around

the rapids in the Sault Sainte Marie River connecting Lake Superior with the other lakes—the Great Lakes have become a highway a thousand miles long and deep enough to float vessels nearly equaling the ocean giants. Between the lake ports of the United States itself about one hundred and fifteen million tons of cargo are carried yearly, in addition to Canadian traffic and traffic between the two countries.

By far the larger part of the movement on the Great Lakes is from Lake Superior to Lake Erie and the southern end of Lake Michigan. One third of all the cargo from the lake ports of the United States originates at Duluth-Superior, which has the distinction of handling a greater freight tonnage than any other port in the world except New York. This dominance of Lake Superior is due to the vast iron-ore business. Although the quantity of wheat, including that of Canadian origin, which passes through the Sault Sainte Marie canals is equal to from one third to one half of the crop of the United States, the weight is only about one fifth that of ore. Other grains taken together are about one third as important in the traffic as wheat. Some nine million barrels of flour also move eastward from Lake Superior annually.

The principal commodity carried up the Lakes is coal, mainly going from Lake Erie ports to Duluth for distribution into Minnesota and the Dakotas. The quantity, however, is only about one fourth that of the iron ore coming down. Most of the ore-carriers go back empty. Highly efficient systems of loading and unloading make it possible for them to "turn around" with remarkable quickness. A cargo of twelve thousand tons was recently unloaded at Ashtabula in four hours at a cost of only three quarters of a cent per ton.

A striking indication of the importance of the lake trade is the fact that the weight of cargo passing through the "Soo" canals (between eighty and ninety million tons annually) is about half again as large as that passing through the Panama Canal and the Suez Canal combined. Equally striking is the comparison of the freight charges on lake traffic as against rail traffic. For cargo passing through the Sault Sainte Marie

canals the average rate per ton per mile from origin to destination — the length of carriage averaging about eight hundred miles — is almost exactly one tenth the average rate for a ton-mile on the American railways. With the present level of buying power of money a ton moved nine miles for one cent is a miracle of modern efficiency.

River and Canal Traffic

The United States is often criticized for improvidence in not making greater use of its rivers and inland canals. It is true that in proportion to area and population a number of other countries transport more goods in this way, the ratio of internal water traffic to railroad movement being much higher than in the United States. But the explanation lies neither in an inherent inferiority of the American rivers or an inherent difficulty in building canals, nor in lack of judgment and enterprise on the part of the American people. Rather is it found in historical circumstances. Europe and Asia were densely peopled before the advent of the railway. The inland-water carrier was the only alternative for slow and costly transportation by animals. The Rhine, the Elbe, the Seine, and the Danube had been improved and brought into large use when the shores of the Ohio, the Mississippi, and the Columbia were trackless wildernesses. The settlement of the greater part of America went hand in hand with the railway.

Greatly as deep water beats the railroad in cheapness of carriage, a winding, shifting river, varying in depth at different seasons and with currents to fight, is quite another story. Except by spending much capital in improvements it offers little or no saving in operating expenses. The inland canal requires large investment; and unless the channel is made exceptionally wide and deep the operating expenses of canal boats are by no means low. Slowness of movement is a disadvantage of both river and canal. So long as the railways of the United States were young and had less traffic

than they needed to meet capital charges, it would have been wasteful to spend huge sums in regulating rivers and digging canals. The rail line was wanted in any case to move passengers, perishable freight, and valuable commodities, where speed is an important consideration. For the time being, it was good economy to let it have the traffic in bulky and cheap goods also. The railways may in some cases have hastened the eclipse of inland-water transportation by unfair local rate-cutting, but it was much more fundamental causes that brought about the practical abandonment of most of the limited system of small canals, the cessation of traffic on many minor rivers, and its decline even on great streams.

Renewed interest in inland waterways has arisen of late. Most of the railways now have heavy traffic. Vast sums of capital must be invested if the capacity of the transportation system is to be greatly enlarged, and it would seem good economy to direct part of it to improving the major rivers and to creating a few deep and efficient canals. No one proposes to resort again to narrow and shallow canals, with boats towed by horses or mules, nor to try to make carriers out of insignificant streams. Only first-class waterways are worth while, and nature has set limits to the number of such that can be created with any reasonable outlay; but where conditions are favorable, large investment on waterways seems to promise good return in the cheapening of transportation of bulk freight. The desire to check the ravages of floods is another incentive for the regulation of rivers.

At present the volume of American river and inland-canal traffic, distance of carriage considered, is relatively small. Much of it consists of short-distance hauls of sand, gravel, stone, and similar local materials. The only important canal that is not a mere connecting link between the natural deep waterways is the Erie Canal, across New York State. This was opened more than a century ago and was long a very important avenue. At present, although tens of millions have recently been spent in widening and deepening it, the

canal carries less freight than before 1850. Apart from rivers like the Delaware and the Potomac, the lower reaches of which are virtually arms of the sea, the only streams with long-haul traffic of much importance are the Mississippi and the Ohio. Freight movement on the Mississippi is still practically nil above Cairo, although recently a beginning has been made. Farther down traffic gradually increases till it reaches about ten million tons annually below Vicksburg. Two thirds or more of the weight of cargo in this lower-river traffic consists of petroleum to and from Baton Rouge. Downstream traffic is heavier than upstream all along the river, but this is not necessarily evidence of the perversity of the Father of Waters, as in all transportation much depends upon the character of the goods seeking movement. Ohio River traffic is about twice as great as that on the lower Mississippi; most of it is coal and sand and gravel destined for Cincinnati and other points on the Ohio itself, only a limited quantity passing down into the bigger river. On both these great rivers traffic, which had long been stationary or declining, has approximately trebled since the close of the World War.

Wide-reaching schemes for improving internal waterways are now being seriously discussed. The chief emphasis is laid on a deep waterway from the Great Lakes to the sea and on development of the Mississippi and its major branches. For the former, two alternative plans have been suggested: a ship canal across New York, and improvement of the St. Lawrence, especially by adequate canals and locks about Niagara and the Lachine Rapids. The St. Lawrence carries an enormous and remarkably steady volume of water, and the only apparent obstacle to the plan is the difficulty of securing satisfactory coöperation between the United States and Canada, especially since the lower part of the channel lies wholly in Canadian territory. An incidental important advantage of the St. Lawrence project would be the great water-power development. A thoroughly efficient waterway would cost several hundred million dol-

lars, but it is urged that it would be of much benefit to farmers and other dwellers in the interior.

The Mississippi scheme has many possible ramifications, among others a deep waterway connecting that artery with Lake Michigan. The almost unprecedented flood of 1927, with its huge toll of loss, gave new impetus to the demand for a thoroughgoing effort to control this mighty stream. The problem is complex and requires exhaustive engineering and economic research. The question Will it pay? must be met at every point. Carefully considered, too, must be the just apportionment of costs between nation, state, locality, and benefited individuals. Sooner or later, no doubt, the rather haphazard methods of the past will give way to a comprehensive and permanent scheme of treatment of the great river and its major tributaries.

SECTION 9. COMMUNICATION

Until a few decades ago communication was merely an adaptation of transportation to a special purpose. Messages were carried (frequently with special urgency of speed that smacks of romance) by human runner, camel, horse, ship, or train. Electrical discoveries opened the way for something wholly new — the instantaneous transmission first of signals that could be made to spell words, then of speech, and now of vision itself. America has played a leading part in the inventions in this field. Equally has it led the world in their practical application.

Though these new methods of communication have supplemented the old in marvelous fashion, they have by no means displaced them. On the contrary, the mail business has increased immensely in volume and has improved immensely in efficiency and promptness. Instant communication, necessarily more costly than communication which takes time, is for many purposes not at all essential. Furthermore, the written or printed word has a record value that is often wanted. With the increasing complexity of business

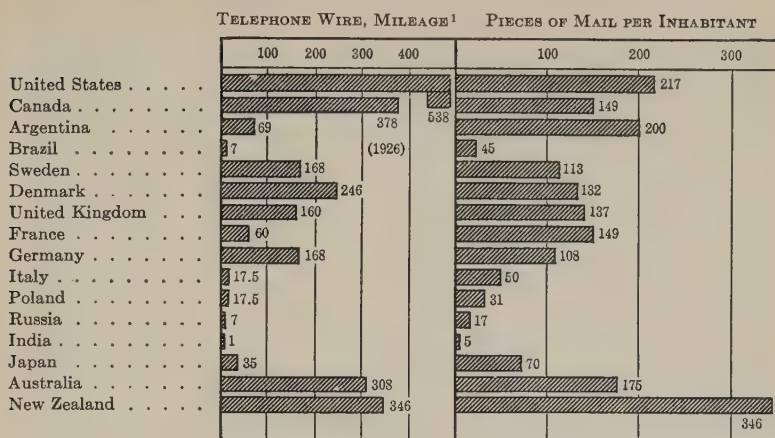
and with the advancing standards of living, the demand for communication, in all its forms, grows in compound ratio. Rapid as has been the expansion in rail transportation of persons and commodities since 1900, expansion in mail and telephone service has been much faster still.

Postal Service

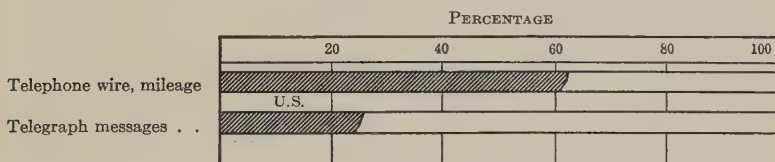
Governments have long considered the handling of mail as both their prerogative and their duty. The general welfare demands that every community shall be kept in touch with the world, even though the cost in many cases far exceeds the possible revenue. It demands too that the charge for carrying mail shall be no higher for the most isolated village or farm than for the large city. This social need is wholly at variance with the profit principles of private enterprise.

Comparison of the volume of postal service in different countries is more or less misleading. The rules regarding what is mailable vary, and so do the practices of the people as to the relative use of the mail and of other methods of carriage. In the United States, express companies handle much business which in some other countries goes by post. Practices also vary as to the proportion of periodicals sent through the mails as compared with those sold on the streets or delivered by special carrier. Taking the statistics of number of pieces of mail as reported, the United States easily leads the world in total volume of business and outranks all other countries save New Zealand in the number handled per inhabitant, although several are not very far behind (see Fig. 85, A). The United States post office carries about two hundred and twenty pieces of mail annually for each man, woman, and child in the population. For the leading countries of northwestern Europe the corresponding ratio is from about a hundred to a hundred and fifty pieces annually per capita. In countries of less advanced industrial and social development the average ranges usually from three or four

A. COMPARATIVE INTERNATIONAL STATISTICS



B. SHARE OF UNITED STATES IN WORLD TOTAL (APPROXIMATE)



C. EXPANSION OF TELEPHONE AND POSTAL SERVICE IN THE UNITED STATES

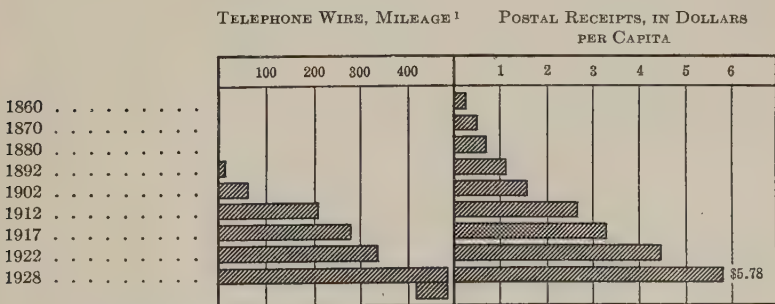


FIG. 85. Diagram showing statistics of postal service, telegraphs, and telephones

Section A (chiefly 1927 data for telephone wire and 1926 data for mail) shows at the left the number of miles of telephone wire (this varies in close proportion with the number of instruments) *per thousand inhabitants* in the several countries, and section C similarly shows the growth in mileage of wire in the United States. The other parts of the diagram are self-explanatory

¹ Average mileage of wire per thousand inhabitants.

pieces to thirty or forty. It is noteworthy that five of the most newly settled countries of the world,—the United States, Canada, Australia, New Zealand, and Argentina,—whose prosperity is largely due to freedom from overcrowding, all outrank any country of the Old World in relative volume of postal business (there is the one exception that Switzerland somewhat surpasses Canada).

The gross postal receipts of the United States reflect substantially the expansion in the volume of mail carried. Changes in the postage rates have not been sufficient to exercise an important influence. In the fiscal year 1859–1860 the gross receipts were \$8,500,000; in 1927–1928 they were \$694,000,000. Per capita of the population the increase was from 27 cents to \$5.78, or over twenty-one-fold. Perhaps no other single set of statistics indicates so vividly the economic and social progress of the country. The relations of the individual citizen to his fellows near and far have become constantly closer and more numerous.

In the United States, as in other advanced countries, recent years have witnessed the rapid development of air-mail service. Often in the face of storm and danger, letters speed across the continent. More than 1,860,000 pounds of mail were handled by the American air service in 1928. The planes carrying this mail covered 5,585,000 miles of flight. The near future will see a far greater extension of this method of communication.

Telegraphs

The great distances of America put a premium on means of “annihilating space.” An American invented the telegraph; an American laid the first transatlantic cable. And today the United States has not only an absolutely much greater telegraph business than any other country, but leads all but two in the amount of business per inhabitant. The exceptions are Australia and New Zealand, where telephone communication, on the other hand, is less developed than in

America. No doubt it is chiefly because the telephone competes more severely with the telegraph in the United States than elsewhere that the relative position of the country in telegraph service is not so dominant. Standards of living and general business conditions being similar, there will naturally be more telegraph wire in proportion to the population in a thinly peopled country than in one densely peopled. For this reason the United States, with about one hundred and seventy miles of wire per thousand inhabitants, has a lower ratio than Canada, Argentina, Australia, or New Zealand. Its per capita mileage is, however, from two to five times as high as in most of even the more advanced countries of thickly peopled Europe. The American telegraph lines handle on an average about two messages yearly per capita of the population, or, more precisely, about 1900 per 1000 inhabitants. The corresponding ratios for France, Norway, and the United Kingdom, which stand at the front of European countries in this respect, range from about 1400 to 1600. The maximum figure, for New Zealand, is far higher, being 11 messages per person annually.

The efficiency of a telegraph system depends on its being able to reach all parts of the country. The business must be either under a single control or in the hands of a very small number of concerns. In most foreign countries this comprehensiveness is attained by government operation. By combining telegraph with postal offices a certain economy is secured, at least in the case of small towns. In the United States the business has always been private; at the present time it is virtually confined to two companies, each serving almost every town, and exchanging messages with one another where necessary.

The mileage of telegraph wire in the United States increased with great rapidity down to about 1913; since then it has grown but slowly, for the reason that inventions have made it possible to carry much more traffic over a single wire than was formerly the case. The multiplex system, installed on many trunk lines, permits eight messages to be

transmitted simultaneously; moreover, various automatic devices commonly used make the operations of sending and receiving faster. The volume of business has continued to grow at a rapid pace, until today it is approximately double what it was fifteen years ago. Expansion of ocean-cable service has kept pace with that in land telegraphs. Despite the growing use of transoceanic radio, American and foreign corporations continue to lay new and more efficient ocean cables and to introduce more rapid methods of transmitting messages. The increasingly close political, economic, and financial ties between America and the rest of the world make ever greater demands for instant communication. It is the opinion of experts that about 95 per cent of the cable business from the United States to foreign countries is handled by American-owned lines, as is also a large fraction of the business in the opposite direction.

Telephones

The United States first gave the telephone to the world and has all along led in improving it. This fact, together with the needs of swift-moving business and exceptional demand for convenience in everyday living, has brought it about that three fifths of the world's telephones are found in this country. It has in the neighborhood of twenty million instruments. In addition to the great number used in business establishments, over half the families in the United States have telephones in their homes. And the saturation point is far from reached: each year the number grows by 5 or 6 per cent, a rate about four times that of increase in population.

The distribution of telephone wire-mileage is closely parallel with that of the number of instruments (see Fig. 85, A). In 1926 there were in the United States over 480 miles of wire for each thousand inhabitants. The next highest ratios are found (as with so many other indicators of standards of living) in those new countries which most resemble this in character of population,—Canada, Australia, and New

Zealand,— in all of which the mileage per capita is about two thirds as high as here. Denmark, which leads European countries, has about 235 miles per thousand people, and the principal industrial nations of northwestern Europe show ratios from one eighth to one third as high as the United States. The much lower standard of living of the countries of eastern Europe, Asia, and South America is illustrated by the insignificant use of the telephone.

The telephone lends itself to centralized operation. Its utility is largely dependent on putting the individual subscriber in connection with all other possessors of telephones. The consequent tendency toward monopolistic operation at first appeared only in individual cities and their environs. As improvement in methods made it possible to bridge longer and longer distances, local concerns were more and more welded together. At present the great bulk of the telephone business of the United States is controlled directly or through subsidiary corporations by the American Telephone and Telegraph Company, almost if not quite the biggest business concern in the world. Other countries present varying conditions as regards telephone ownership. In a large proportion of them the whole or a great part of the business is operated by the central government alone or by that government working in conjunction with municipalities. As with the railway traffic, the greater volume of telephone communication in America and its superior efficiency are largely attributable to fundamental differences in the character and standards of economic life.

We are so accustomed to talking almost as freely over the telephone as face to face — to ordering groceries, gossiping, making dates, and conducting business of all sorts by this means — that we easily forget how new a thing it is. Within the lifetime of millions the telephone was wholly unknown. In 1902 less than 2,400,000 telephones were in use in this country, only about one eighth as many as now (see Fig. 85, C). The growth has been at a remarkably uniform pace. Much faster than the increase in the total number of tele-

phones has been the advance in the long-distance business. Only fifteen or twenty years ago it was considered an achievement to talk from New York to Philadelphia ; now the voice carries from ocean to ocean. The number of long-distance messages has nearly quintupled since the year 1910, and on the average each message travels much farther now than formerly. The only handicap upon far greater employment of "long-distance" is the fact that each conversation requires use of a very large capital investment.

One of the major services of the telephone has been to break down the isolation of the rural community. Today a larger proportion of the farmers have telephones than of the dwellers in cities. Along with the automobile this new tie has united the farm with the world as never before. It has contributed to making the farmer a business man among business men and to making his wife a full participant in the social life of the community. In several of the farming states of the Middle West there are about as many telephones in proportion to the population as in the state of New York, the greatest center of industry and commerce ; in Iowa there are more. In 1927, in the West North Central geographic division as a whole, there were 197 instruments for each thousand of the population, or almost as many as there were families. In the order of the ratio of telephones to population the sections of the country rank as follows : (1) Pacific, (2) West North Central, (3) New England, (4) East North Central, (5) Middle Atlantic, (6) Mountain, (7) West South Central, (8) South Atlantic, and (9) East South Central. California ranks highest among the states, followed by Iowa, Illinois, New York, Kansas, Nebraska, and Massachusetts.

Radio

Newest and most unbelievable of agencies of communication, the "wireless" has already become an important factor in the life of the people and is still more a sign of things to come. Every ether wave set in motion by the radio trans-

mitter flies in every direction over the earth. It is no wonder that as yet no wholly adequate means of preventing interference has been attained, — a fact which sets a certain limit to this means of communication. Radiotelegraphy, which had made much progress before radiotelephony had been realized, has done much to add to the safety of ships as well as to the convenience of ship operation and of travel. It is used on a large scale for communication across the seas and for overland messages to peculiarly inaccessible points. The wireless telephone has in the last year or two been perfected to such a degree that Europe can talk readily with America, and the charges for the service are being markedly lessened. The most conspicuous activity of the wireless is broadcasting. The eloquence of the statesman; the staccato word picture of the prize fight; instruction in science, literature, art, or bridge; the classic strains of the great soloist; the jazz of the jazziest of bands, — all are heard in millions of homes.

Radiotelegraphy and transoceanic radiotelephony are conducted by corporations (in certain foreign countries by governments) on the basis of tolls, in much the same manner as the sending of messages by wire. The statistics show rapid growth, but the totals are not yet comparable with those of the wire telegraph or the wire telephone. Radio broadcasting is done chiefly by concerns which are engaged in other telephone and telegraph business or in the manufacture of electrical apparatus, or which use the radio as a means of advertising; the hearer pays nothing directly for the service. The only statistical measure of the volume and growth of the business is furnished by the reports of production and sale of receiving and sending apparatus, which have reached scores of millions of dollars annually.

CHAPTER XII

FOREIGN TRADE

SECTION 1. THE MAGNITUDE OF AMERICAN TRADE

The foreign trade of the United States, like that of any other country, reflects its economic life. The history of trade tells much of the history of industry. The character of the commodities exported and imported reveals the country's resources, activities, and standards of living. Trade with the outside world plays a smaller part in the economic life of the American people than in that of many others, and this is a matter for congratulation, not for regret. Nevertheless foreign trade is of great importance to the welfare of the United States. Without importation homes and tables would lack many a nicety, and industries much that makes for efficient production. Without exportation many of the farms, mines, and factories would languish, and the country could not make the most effective use of its resources and its energies.

The primary motive in foreign trade is the desire for things not to be had at home. A country exports in order that it may import, just as the individual produces and sells in order that he may buy. How much a nation will actually import depends chiefly on two factors: the degree of its self-sufficiency and the standard of living of its people. The more abundant and varied its resources and industries, the more completely it is able to supply its own needs and the less it is driven to seek goods without its borders. On the other hand, a rich people can afford to buy goods which a poor people must forgo. The United States has less need to import than almost any other country. In proportion to its popula-

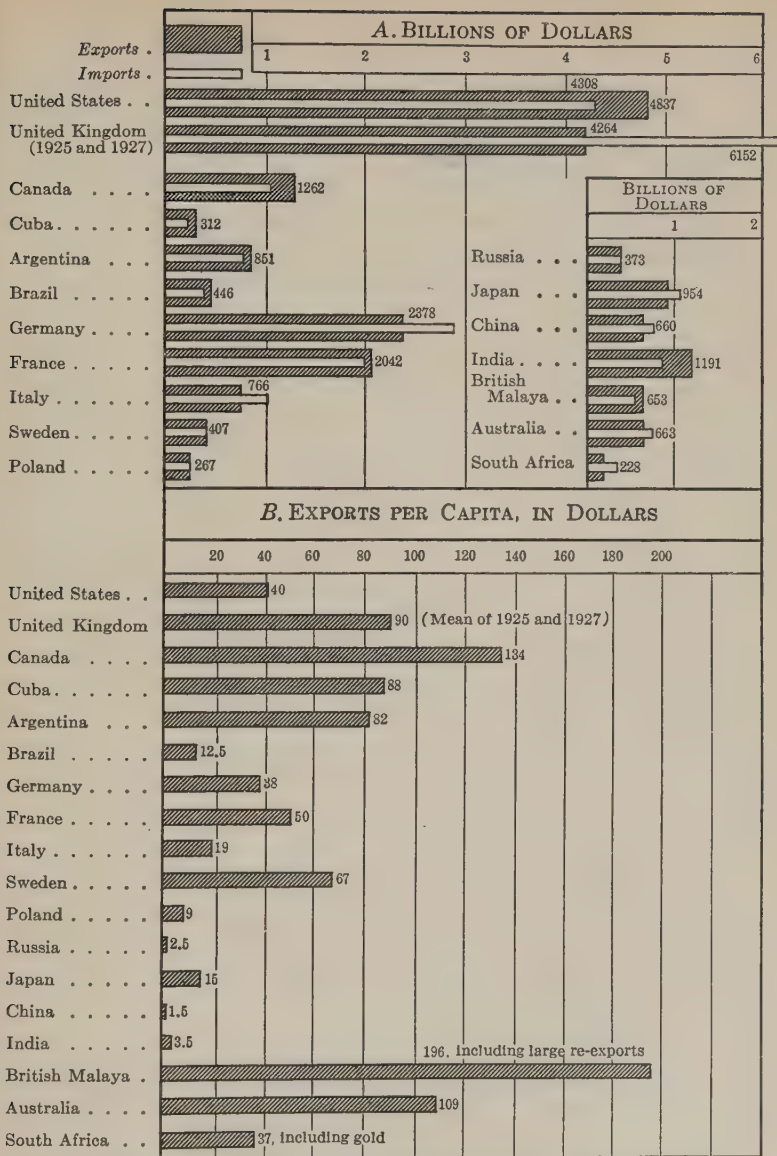


FIG. 86. Diagram showing exports and imports of principal countries

The data represent averages for 1926 and 1927 except for the United Kingdom, where 1926 was abnormal. In section A the broader bar shows exports, and the other bar imports. The inserted figures refer to exports in millions of dollars

tion it actually does import more than most countries. The value of a nation's imports substantially determines the value of its exports. Save under special circumstances the two cannot long remain far apart. We do not send goods abroad to get rid of them. However great a country's capacity to produce, it will in the long run export only as much as will pay for what it wants from the foreigner.

During and since the World War the United States has been the world's greatest exporter, supplanting Great Britain, which formerly held the palm. That country still outranks this in value of imports. During the years 1926-1928 the exports (foreign goods included) of the United States averaged \$4,934,000,000 annually ; its imports, \$4,236,000,000. In 1929 exports reached \$5,248,000,000. These totals do not include commerce with Alaska, Hawaii, and Porto Rico, which, as regards trade statistics, are treated as integral parts of the country. If, following the practice of most other countries, trade with these possessions is added, it increases the export figures by about \$200,000,000 and those of imports by about \$250,000,000. The exports of the United States consist almost entirely (98 per cent) of domestic merchandise, the product of its own fields, forests, mines, and factories. The commodities that the country sends abroad make up nearly one sixth of the entire international trade of the world.

Great Britain's total exports average about one fifth less than those of the United States. But Great Britain is the greatest of all middlemen ; about one sixth of her total represents reexport of foreign goods. Other countries whose exports exceed a billion dollars per year are Germany, France, Canada, and India, usually ranking in the order named. The contrast between the trade of the United States and that of some countries is a striking commentary on standards of living. China, with four times as great a population, has only about one sixth as much foreign trade. Prewar Russia, decidedly outnumbering the United States in inhabitants, exported less than half as much as this country was then ex-

porting ; today Soviet Russia exports much less still, whereas American exports have nearly trebled in value.

Trade comparisons are more significant when reduced to a per capita basis. On this basis the United States occupies a middle rank among the nations. Its varied resources and well-rounded industrial development enable it to get along with relatively few imports as compared with some countries, and its wealth enables it to import more per capita than a good many others. From 1926 to 1928 American imports averaged about thirty-five dollars annually for each person, and exports about forty-one dollars. Far-off New Zealand leads the world with four times as great a trade per capita as the United States.¹ That new and richly endowed country, like America, has a high national income and advanced standards of living. As yet, however, it has developed little manufacturing industry ; therefore it imports a great quantity and variety of the more elaborate commodities and sends out a great volume of agricultural products to pay for them. Similar conditions explain the volume of Australian and Canadian trade. Argentina differs from these English-speaking countries only in being somewhat less rich and less able to pay for imports. Cuban trade presents an extraordinary picture. Relatively low standards of living prevail among the masses ; at the same time their energies are so concentrated upon the production of sugar and tobacco that, in proportion to the number of inhabitants, Cuba's trade is more than double that of the United States. It imports much food as well as manufactured goods of all kinds.

Several of the densely populated countries of Europe also have a greater trade per capita than the United States. This is not because they can better afford imported goods, nor is it because they are more efficient competitors in selling abroad : they have to import more in order to live, and they must export correspondingly. Overpressure of population on

¹ In certain recent years, on account of the abnormally high price of rubber, the per capita trade of British Malaya has been greater than that of New Zealand, but it includes a good deal of reshipment of foreign goods.

the land and lack of certain basic resources compel them to develop a big foreign trade. The great bulk of Europe's imports are things of prime necessity; comforts and luxuries play no such part as in American import trade. England is the richest of European countries and at the same time, next to Belgium, the most dependent on the outside world. Much of the food and raw materials she requires must come from abroad. In proportion to population Great Britain's imports (less reëxports) are more than treble those of the United States, and her exports of domestic products nearly double.

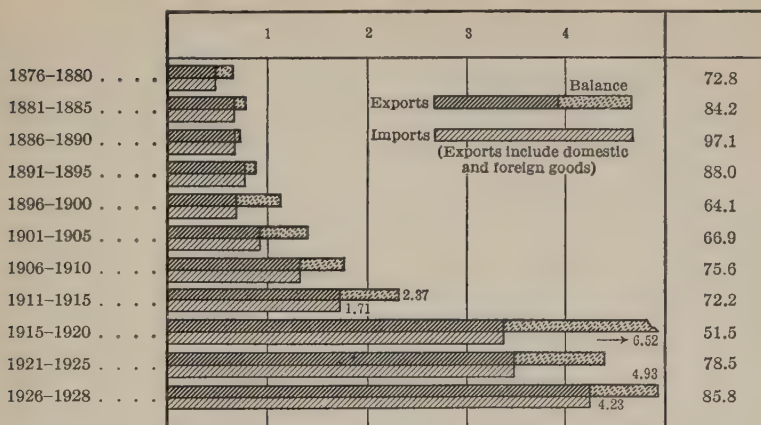
At the opposite end of the scale are the poor and backward countries, such as China, India, and Russia, which have low productive capacity and a consequent low standard of living. They are thus forced to put up chiefly with what they can wring from their own overtaxed agricultural resources. They have had neither the capital nor the capacity for any large development of mineral resources, transportation, and manufactures. Their domestic production lacks variety, but it also lacks the wherewithal to pay for variety from abroad. In proportion to population America exports and imports from ten to twenty or more times as much as countries of this type. It is encouraging to note, however, that most of the less advanced countries have been gaining steadily in volume of foreign trade.

SECTION 2. GROWTH OF FOREIGN TRADE

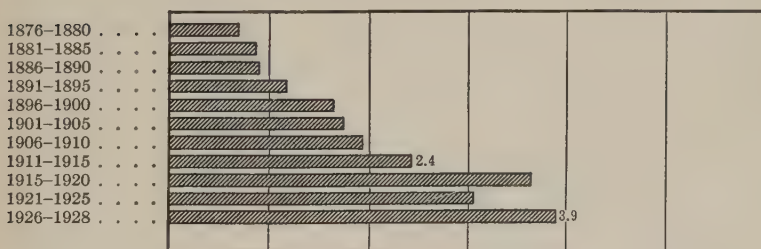
The trade of the United States has grown with great rapidity. There has also been a very considerable shift in the character of both the exports and the imports. Neither this growth nor this shift, however, reflects any basic change in the economic situation of the country; neither points to increasing dependence on foreign commerce for the maintenance of national production and national consumption.

In terms of money value the exports of the last few years have on the average been seven times as great as half a century ago. From 1876 to 1880 they averaged \$677,000,000

A. ABSOLUTE VALUE OF TRADE, IN BILLIONS OF DOLLARS



B. VALUE OF EXPORTS AT 1913 PRICES (APPROXIMATE)



C. VALUE OF EXPORTS (EXCLUDING REEXPORTS) PER CAPITA, IN DOLLARS

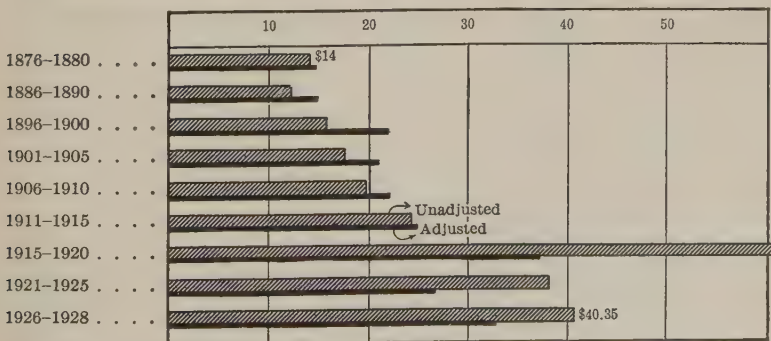


FIG. 87. Diagram showing the growth of the foreign trade in annual averages

In section B, and in the narrow bars of section C, rough adjustment for price changes has been made. Sections A and B include the small reexports of foreign goods

annually; in 1929 they reached \$5,248,000,000. Imports have shown even greater expansion. During the war they fell far behind exports, but they have since more than regained their relative position. Changes in trade statistics, however, require interpretation in the light of the marked fluctuations that have taken place in the buying power of the dollar.¹ The export data thus (necessarily roughly) adjusted show a growth much more uniform than appears from the original figures. The war peak, in particular, is much flattened. On the basis of dollars of 1913 buying power, exports from 1926 to 1928 were more than five and one-half times as great as from 1876 to 1880, much more than double the exports of the last five years of the nineteenth century, and over 60 per cent larger than those from 1911 to 1915. They have even exceeded the level of the peak years of abnormal war stimulation. The imports of these last years have been much the heaviest in American history, allowance being made for changes in price. They averaged about 80 per cent greater from 1926 to 1928 than in 1913, and increased about 15 per cent more in 1929, an increase largely hidden by a decided decline in prices.

The growth of trade takes on greater significance when compared with that of population. Expressed in terms of "1913 dollars," the exports of half a century ago were less than fifteen dollars per capita. From 1926 to 1928 they reached nearly thirty-three dollars and in 1929 about thirty-five dollars. The present export trade per capita is more than half again larger than at the close of the last century, and about one-third larger than just before the World War, adjustment being made for price changes.

Considerable variations appear from time to time in the

¹ The Department of Commerce has calculated indexes of average changes in prices of exports and imports, on the basis of 1913 prices taken as 100, for each year since the armistice. A rough correction of export values during earlier periods may be made by means of the wholesale-price index of commodities in the domestic market. The composition of the import trade, however, is so different that the use of this index for adjusting import values would not be justified.

rate of growth of export trade, apart from the temporary ups and downs due chiefly to good and bad harvests of wheat, cotton, and tobacco. From the close of the Civil War down to about 1880 sales abroad (after adjusting for variations in price) rose much faster than the population. The opening up of the vast central prairies made possible greatly increased shipments of grains and meats. Exports of the great staple of the South were also growing rapidly. This movement in agricultural exports is obscured in the statistics of values by the marked decline in the prices of farm products. From about 1880 to 1895, exports scarcely kept pace with growth of population. Repeated poor grain crops reduced the agricultural surplus. The later nineties, however, witnessed an exceptionally rapid advance in per capita exports even after eliminating the influence of the price advance which had set in. This was a period of very large foreign sales of foodstuffs. Exports of petroleum products, of copper, and of iron and steel and their manufactures, including machinery, were rapidly gaining during this period.

For about ten years at the beginning of the present century the situation changed. The dollar value of American exports advanced markedly, but the figures adjusted for changes in price show less increase than that in population and less than that in the trade of most other countries. There was a marked falling-off in exportation of foodstuffs, then a far larger share of the total than now. The world over, trade in foodstuffs tends to grow but slowly at all times, contrasting with the marked upward trend for manufactured goods. American exports of manufactures were growing rapidly during these years, but it was not until 1911 that they sufficed to bring about any advance in total exports per capita (adjusting for changes in price). For two or three years immediately before the outbreak of the World War, however, exports per capita, in terms of quantity, were somewhat greater than at the beginning of the century.

The war period was wholly abnormal. By changing the direction of production, by stinting its own consumption in

certain lines, and by postponing construction and equipment, the United States was able greatly to expand shipments to needy Europe, both of foodstuffs and of manufactured goods. Even after eliminating the effect of soaring prices, exports per capita reached unprecedented figures. There was a sharp setback when the postwar boom collapsed. With the rapid gain during almost every year since 1921, the export trade has now reached a point, even in proportion to population, about equal to that during the war period.

SECTION 3. THE RELATION OF FOREIGN TRADE TO DOMESTIC PRODUCTION

One of the most basic facts in American economic history is that, broadly speaking, expansion in foreign trade has not been faster than in domestic production. Contrary to the rather common opinion, exports do not constitute a larger proportion of the total output of the country, nor imports a larger proportion of its total consumption, than a quarter or even half a century ago. The greater and greater per capita production has meant greater buying power per person. Part of that greater buying power has been used to purchase more goods abroad, especially exotic luxuries and semi-luxuries. To pay for these the United States has, of course, had to increase its exports per capita, but not to send out a larger share of the product of its fields, mines, and factories.

Up to about 1900 statistical data are not adequate to show at all closely what proportion of the domestic product was exported. It is certain, however, that during that period (about 1898) when our agricultural exports were, in proportion to population, at their peak, the United States was sending abroad a bigger share of its total output of all commodities than at the present time.

For comparison with export trade it is most convenient to take into account the output of agriculture, mining, and manufacturing industries only. These industries produce very nearly all the commodities that are physically capable

of exportation. The products of construction cannot, of course, be moved. There is, moreover, an immense amount of services of transportation and distribution and of personal services of bewildering variety which do not incorporate themselves in movable commodities. Were comparison made between the value of foreign trade and the total output of the American people, the ratio would be very modest. At present it is only 5 or 6 per cent. This is a much lower ratio than in many other countries of the world.

At the beginning of the present century the exports of the United States were equal to about 13 per cent of the net value (excluding duplications) of its agricultural, mineral, and manufactured products. Subsequent census years down to the war period showed a lower ratio; in 1914 it was a little less than 10 per cent. The nation's great war effort is seen in the fact that for the year 1919 this ratio reached nearly 16 per cent, no doubt the highest point ever attained in the national history. Although during the past few years exports have much exceeded their prewar volume, the ratio to domestic production has been no higher than before the war. In 1927, the latest year for which full data are available, the ratio was again less than 10 per cent (approximately $9\frac{1}{2}$ per cent).

Similarly, it could be shown that imports do not represent a more important factor in the consumption of the American people than at former periods of time. The detailed figures need not be presented, since the growth of imports has roughly paralleled that of exports.

The fact that foreign trade has not become relatively more important in their economic life is far from being a matter of regret on the part of the American people. It does not minimize the growth of exports; rather it emphasizes the expansion of production. It means that the United States has not become less self-sufficing as it has filled up with inhabitants. With the rich resources at its disposal and with its increasingly efficient methods, American industry has been able not only to keep pace with the expansion of population but to furnish the wherewithal of an ever rising standard of

living. Exports have not had to grow faster than production because, relatively to its total consumption, the United States has not needed more goods and services from the outside world. In particular, the fact that export trade does not represent a larger share of American output now than just before the war is what would be expected. The war cut down the production and the buying power of many countries. It slowed progress in the United States but did not stop it, and since 1921 the national output has risen perhaps faster than ever before. Under these conditions the domestic market was for some years after the war better than the foreign market. The country's buying power for its own products exceeded the buying power of other peoples for those products. Only in the last year or two has the recovery of world trade restored the domestic and foreign markets to the relative position which existed before the war.

The prewar history of the relationship between foreign trade and domestic production in the United States differed from that in the leading industrial countries of Europe. Until the great conflict choked off their progress those countries too had considerably expanded their domestic production, although not so fast as the United States. Their foreign trade, however, had increased faster than the output of their industries. Indeed, from 1900 to 1913 the European nations, as a group, expanded their exports considerably more than the United States. This was due to the fact that a great part of their foreign sales consisted of manufactured goods, whereas at that time farm products greatly dominated in the American export trade. The United States was leading Europe in adding to its exports of factory products, but falling behind in the aggregate for all commodities. The European industrial nations were, to be sure, gaining in prosperity during this prewar period. They would have gained more had their growing production been able to find its market, and their growing consumption its supply, more largely within their own boundaries. Europe's progress in foreign trade meant increasing dependence on the outside world.

SECTION 4. THE INTERNATIONAL BALANCE OF PAYMENTS

The exports of the United States materially exceed its imports. This has been the case almost continuously for half a century. The time has long since passed when the term "favorable" as applied to balance of trade has been more than a convenient phrase to signify an excess of merchandise exports over merchandise imports. Statesmen no longer conceive of the inflow of gold in payment for exports as the goal of national effort. Experience has taught that too much of that delusive metal may readily be a curse. The balance of merchandise trade, whether on the one side or on the other, is not so much a causal factor in a nation's economic life as a resultant. An excess of exports, when due to certain causes, may be a sign of national prosperity; when due to other causes it may be quite the reverse. In the United States just at the present time the "favorable" balance conspicuously reflects a high measure of national prosperity and efficiency. It marks ability to spend liberally and to store up wealth for the future.

In comparing balances of trade it must be borne in mind that the American system of valuing imports is exceptional. Most governments assess them as of the time and place of arrival, thus including transport charges; the United States values them as of the country of origin, without transportation costs. If the prevailing practice were followed here, the import figures would be from 5 to 7 per cent higher, and the "favorable" balance would be considerably lower; in 1926 it would almost have disappeared.

Exports and imports of commodities are only part, although much the largest single part, of the business transactions between one country and another. There are numerous other items in the international ledger. In the case of the United States some of these are of great magnitude. The balance in merchandise trade may be offset in other accounts. As between any two countries, there is seldom a close balance even in the aggregate of all classes of transac-

tions, but in the relations of any country with the outside world as a whole there must of necessity be such a balance. Moreover, in the long run this must be effected without extensive movements of the precious metals. Unfortunately, the imperfections of statistics make it difficult to follow out the precise manner in which the final balance with the world is struck. The chief entries in the international accounts of the United States (some of them rather rough estimates) are shown in Fig. 88. The data relate to 1926 and 1927, which were much more normal in this respect than 1928 or 1929, in which years the great speculation on the Stock Exchange radically changed the international movements of capital.

During the two years 1926 and 1927, according to the official trade statistics, the United States exported goods valued at \$530,000,000 a year more than its merchandise imports. Making allowance for smuggling and other minor adjustments, this excess reduces to a little over \$400,000,000. Foreigners had to make good this difference in some way. In addition they had to meet other current obligations to Americans and the American government, the biggest item being for interest and dividends on loans and investments; the total for the group amounted to more than a billion and a half dollars. The United States, on the other hand, had to use a large part of the sums that came to it in paying some hundreds of millions each year for the pleasure and profit of its globe-trotting citizens. The seat at the opera, the scaling of the mountain peak, the delicate dinner in the foreign restaurant,—these call for a bale of cotton or a typewriter or a pair of shoes from the other side of the water. Other scores of millions of the export balance must go to transfer the remittances of immigrants to friends and relatives they have left behind. Payments to foreigners under these and other “invisible current accounts” somewhat more than offset the corresponding but very differently distributed sums coming to Americans from the other side; the balance against the United States in items of this group in 1926 and 1927 averaged about \$90,000,000.

CREDITS, CREATING
IMMEDIATE CLAIMS
AGAINST FOREIGNERS

DEBITS, CREATING
IMMEDIATE CLAIMS
AGAINST AMERICANS

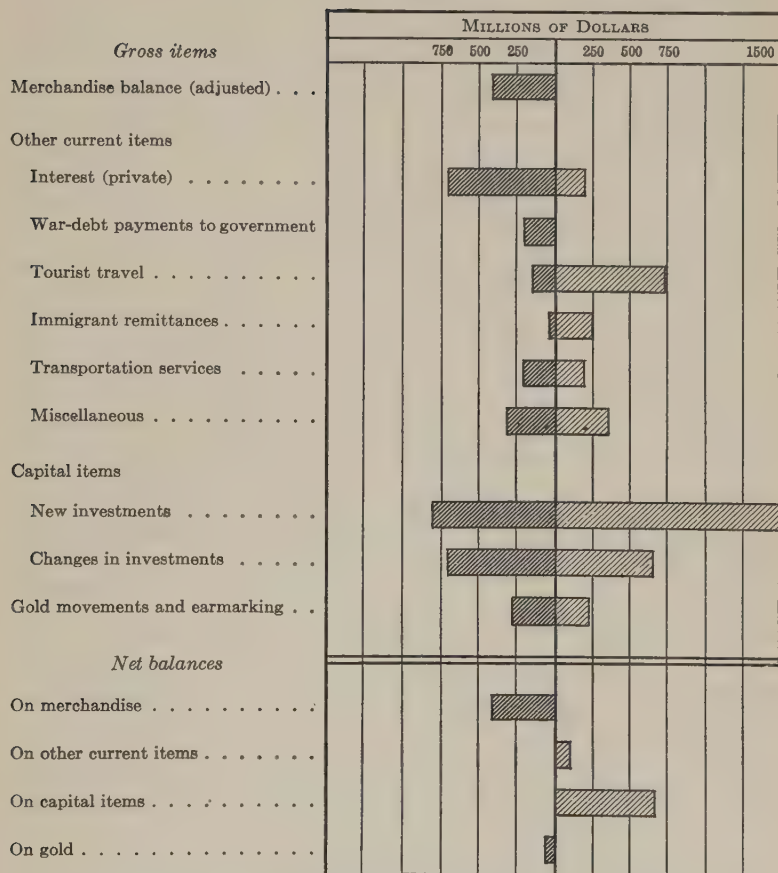


FIG. 88. Diagram showing the international balance of payments of the United States

The figures represent averages for 1926 and 1927 as published in the bulletin of the Department of Commerce for 1927 (certain of the estimates were revised in the bulletin for 1928). The bars to the left of the center show sums received by or due to the United States; those to the right show sums paid out by the United States or due from it to foreigners. For example, the bar for tourist travel at the left represents the expenditures of foreigners traveling in the United States, and the bar at the right the expenditures of Americans traveling abroad. The bars under the heading "Net balances" represent the difference between the totals of the two sides for the respective groups. See also discussion in text

In addition to this the citizens of the United States are lending heavily to foreign governments and corporations. The new loans made during 1926 and 1927 averaged a billion and a half a year. In substance such loans are carried abroad chiefly by sending goods, either directly or indirectly. They are a debit against the excess of credits on merchandise trade. Putting the matter another way, Americans buy securities abroad, which they must pay for just as they pay for imports of rubber or silk. Against these new loans and sundry purchases of outstanding foreign securities and other investments abroad on America's part, there are offsetting items of large amount. Sundry repayments of principal are made by foreign governments and others. Foreigners, particularly Europeans who distrust investments in their home countries, have been buying many American securities. For the two years mentioned the balancing of these movements of capital left a net excess of investment of American capital abroad which averaged about \$640,000,000 annually. This, added to the balance against the United States on current "invisible items" covered by the statistics, gave a total more than accounting for the excess of merchandise exports over imports. Nor was this net balance against the United States met by large export of gold or by "earmarking" of gold held in America as being the property of foreign banks. The excess of credits in gold over debits during the two years taken together averaged less than \$50,000,000 annually, though considerable exports occurred in 1927.

The truth is, no doubt, that other items, not covered in the statistics, came in to cover the apparent deficit. For example, it is known that in recent years foreign banks have been lending American banks large sums on current deposit accounts. They often prefer to hold part of their reserves in this form, for safety as well as profit. At the same time that the United States is making long-term loans to foreigners, it is borrowing from them in smaller amount on short term.

We thus see that the explanation of the fact that the United States has at the present time a considerable balance

in its favor on merchandise trade is found in the huge items of so-called "invisibles" — especially tourist expenditures, immigrant remittances, and, above all, new placements of capital in foreign countries. All these are evidence of American wealth and prosperity.

Practically all European countries and a number of countries elsewhere import more than they export. A very material fraction of the "unfavorable" balance of several such nations represents the entertainment of American tourists or the receipt of American remittances and investments. Great Britain's heavy excess of imports is explained chiefly by the sums which other countries have to pay for the services of her great merchant fleet in carrying their goods, or for returns on the vast capital investments which, for all her war losses, British citizens still hold in foreign countries. One way in which the United States helps England to balance her accounts is by huge purchases of rubber in British possessions. These are translated into dividends of English rubber companies. The trade balance against the United Kingdom in her commerce with the world as a whole is much greater than before the war. This is because for the time being she has not the means to send abroad capital for new investments on the former scale.

Among those countries which export more than they import, no other country does so for the same reasons as the United States. Countries such as India, British Malaya, South Africa, Canada, and Brazil have normally a "favorable" balance mainly because of the payments they must make for the use of British, American, and other foreign capital. They are debtor countries. They are not necessarily, of course, the less prosperous on that account. The United States was formerly in much the same position. Any developing country is likely to change its position from time to time with respect to inflow of foreign capital and outflow of interest and dividends. At one time the new placements may exceed the payments for capital already in use; at another the opposite may be the case.

Changes in the Balance of Trade

Very considerable changes have appeared in the balance of American merchandise trade during the past century. Moreover, the factors determining that balance have varied greatly at different periods. From the beginning of national existence down to 1875, imports were in most years greater than exports. This was largely because immigrants were bringing considerable sums of money with them from Europe and because European investors were placing much capital in the United States for the development of its new resources. From that time down to the outbreak of the World War, exports in most years materially exceeded imports (see Fig. 87). Immigrants were making remittances back to Europe; American tourists were more and more spending money in Old World capitals; interest and dividend payments on existing investments of foreigners, together with repayments of principal to them, were at most times heavier than the new investments flowing in. The excess of exports from about 1898 to 1908 was relatively the greatest in the history of the country except for the period of the World War. Several years of the late eighties and early nineties, however, were exceptional. In three of these years there was a slight excess of imports, and in three or four others the "favorable" balance was small. Decline in the prices of some of the major agricultural exports and advance in the prices of certain import commodities, notably coffee, affected the balance. These were years of hard times for American farmers, many of whom were unable to pay interest on farm mortgages held in Europe. Many railroads went into the hands of receivers, and their payments to foreign investors were cut down.

With the World War came one of the most extraordinary phenomena in the history of commerce. During the six years 1915 to 1920 the United States poured abroad goods to the immense value of \$38,000,000,000. This exceeded the value of imports by over \$18,000,000,000. During each of the years from 1916 to 1919 the exports were more than double

the imports. Two principal factors explain this enormous balance: the expenditures of the American military and naval forces abroad, and the creation and shifting of credits. Needy Europe sold back to the United States the bulk of the securities representing her investments there. She also sold many securities covering investments in other countries. She borrowed great sums from private American citizens and more still from the government. The national government lent more than \$10,000,000,000 to the Allied powers. The greater part of the funds realized by Europe from these transactions went to pay for supplies bought in the United States. It was this cataclysmic overturn of normal economic relations that made this country the greatest creditor nation. Factors which will greatly affect its balances with the world for an indefinite period to come were formed in the fiery crucible of war. As a further result of the excess of exports during the war, a flood of gold poured into the country. During the three years 1915-1917, before United States government credits became available to the Allies, net imports of gold to pay for American goods amounted to \$1,132,000,000. This influx sent the prices of commodities in America skyward, and they still remain much higher than before the war.

During recent years the balance of trade on the "favorable" side has declined again and on the average has been relatively lower than just before the war. Moreover, the conditions that explain the excess of exports since the war are in considerable measure different from those that formerly prevailed. As has been seen, large investment of American capital in foreign countries has played a major rôle.

The Trade Balance and the Future of Exports

Anxiety is displayed in certain quarters lest the shift of the United States from a debtor nation to a creditor nation should ultimately bring with it a chronic "unfavorable" balance in merchandise trade. If present forces continue to

operate, this seems scarcely likely to happen for a good while to come ; in any case it could not be considered a disaster. So long as the country continues to prosper and accumulate wealth a considerable fraction of the annual savings of the people will be put into foreign investments. The process of investing in itself tends toward excess of merchandise exports. On the other hand, each new investment, if it prove fortunate, creates an income which can serve to pay for imports and thus tends to diminish the need for payment by export of commodities. It is quite possible that ultimately the income from past investments will exceed the annual new placements of capital. Probably a long time will elapse, however, before the excess will be sufficient also to pay for America's heavy tourist expenditures and immigrant remittances. And after all, the United States would not suffer should the balance of trade turn against it : it would simply be receiving part of what it needs from abroad without having to send commodities in payment. Commiseration would be misplaced for an individual whose income from past savings enables him to get part of what he wants without today working for it.

Whatever happens in the future with respect to the balance of trade, there is no likelihood of a decline in the volume of exports from the United States as the result of invisible factors in its international transactions. Changes in those invisible factors tend, in the nature of things, to be gradual rather than violent. During the process both exports and imports will no doubt continue to increase. Even should the balance ultimately become normally against the United States, this would not in itself put a check to the growth of its export trade. Foreign investments, along with their direct effect on trade, have an equally important indirect effect. Countries that receive capital use it largely to develop their productive capacity. They thus become better able both to sell commodities and to buy them. Trade thus engendered may expand greatly.

The Trade Balance and European Debt Payments

In contrast with this fear lest the American trade balance turn "unfavorable," many Europeans complain that the United States does not import enough. How, they ask, can it expect to collect interest and principal on the war debts and a return on its huge private investments abroad if it holds down to a minimum the inflow of goods as means of payment? This line of argument is sometimes directed toward the cancellation of war debts, sometimes toward such a reduction of the American protective tariff as would permit Europe to send in more manufactured goods. A full discussion of this subject would require great space and involve us in much that is controversial. A few points bearing upon it may be briefly mentioned.

The great and growing importance of American "invisible current imports," most of which are credited to Europe, must not be overlooked. They are just as real a means of enabling European countries to pay their debts to the United States as are imports of commodities. American tourists spend in France more than American importers buy there; the same is perhaps true of Italy. In the second place, the imports of the United States in most recent years show more increase over prewar figures than its exports. From 1926 to 1928 annual imports averaged 150 per cent greater in value than from 1910 to 1914, whereas the increase for exports was 128 per cent. In the prewar period imports were equal to 78 per cent of exports; in the later period the proportion averaged nearly 86 per cent. To be sure, in 1928 the ratio of imports to exports fell sharply, but this was due solely to a decline in prices of import commodities. The ratio rose again in 1929, and with the steady increase in the quantities of goods purchased abroad it seems likely to stand usually well above prewar levels.

It is true that the imports of the United States from Europe have not increased as much as the exports to that continent, though the idea sometimes put forth that imports

from Europe are much less than before the war is without foundation (the average for 1926-1928 was, in terms of money, more than 50 per cent higher than that for the five years preceding the war, an advance materially surpassing the rise in prices). It is but natural that the United States, constantly advancing in manufacturing industry, should expand its imports from raw-material continents more than those from one which has chiefly fabricated wares to sell. Moreover, since the war Europe's restricted capacity to produce goods has been an important factor in holding down American imports from European countries. Europe has had even greater difficulty in selling in other markets. An analysis of the trade returns of the five principal warring countries — the United Kingdom, France, Belgium, Italy, and Germany — shows that between 1913 and 1927 their exports to the United States increased much more than their exports to all other countries combined, 50 per cent as compared with 27 per cent. Later data tell much the same story.

In any case the ability of Europe to pay debts in America is not primarily determined by American imports from Europe itself. International trade is full of triangles (for further discussion on this point see Sections 9 and 10). If the United States buys goods in Asia, and Asia buys from Europe, Europe is thereby enabled to make payments in the United States. One of the major factors that has been at work in helping war-torn Europe to get on its feet is the immense increase in American purchases in non-European countries, notably in countries which are colonies of European powers or in which European capital is largely invested. The huge importation of rubber into the United States from British overseas possessions is a conspicuous case in point. The large and growing imports from Asia, Oceania, Latin America, and Africa create in those continents new buying power, part of which they spend in purchasing American exports but more in purchasing European exports. The exports of ten of the leading non-European countries (Argentina, China, India, Ceylon, British Malaya, the Netherland

East Indies, Australia, New Zealand, the Union of South Africa, and Egypt) to the United States increased about 350 per cent between 1913 and 1927, whereas their exports to all the rest of the world increased by only 63 per cent. Their imports from countries other than the United States — largely coming from Europe — meanwhile increased by about 67 per cent; and although their imports from the United States rose by a far greater ratio (260 per cent), the disparity was much less than that in the above-cited figures of their exports. In other words, had they sold less to America they would have bought less from Europe.

Broadly speaking, Europe's ability to pay debts to the United States depends on her ability to produce and export to any part of the world, and America's imports from Europe itself may readily play only a secondary rôle. Whether payment of debts would be facilitated by greater direct imports from Europe is a question the answer to which would depend largely on whether American industry continued to prosper in the face of such imports, enabling the country to keep up also its big importation from other parts of the world.

The Balance of Trade and the Business Cycle

Apart from long-time and basic changes in the balance between exports and imports there are many temporary fluctuations. Good or bad crops may affect it materially. So also do the price movements of major commodities. The general ups and downs of the so-called business cycle likewise enter in. The influence of these is not what many persons fancy. Although at times there are exceptions, highly prosperous and active domestic business in the United States is usually marked not by a greater "favorable" balance but by a smaller one. Consumers demand more foreign comforts and luxuries. Manufacturers buy more raw materials. Often too producers, finding a strong home demand for their goods, neglect their foreign customers or at least fail to push sales abroad vigorously. The highly active year 1923 offers

a striking example. The balance of trade on the export side was much less than in any previous postwar year. Imports increased (in money value) 22 per cent over 1922 as against 9 per cent for exports. The year 1925 was more prosperous than 1924, and partly on that account the export balance fell off. Conversely, years of business depression such as 1893-1894, 1907-1908, and 1921 are usually marked by large excess of exports over imports. The rise in the excess of exports in 1928, as has already been stated, was due to a special price movement in imports.

SECTION 5. GENERAL CHARACTER OF AMERICAN EXPORTS AND IMPORTS

The nice balance between the great branches of industry in the United States is mirrored in the composition of its foreign trade. Exports and imports of most nations show a much less normal make-up. They are either primarily agricultural countries or primarily industrial. Either foodstuffs and raw materials dominate in their exports and manufactured goods in their imports, or the reverse is the case. The United States is a big exporter both of cruder and of more advanced products.

During the past decade, as a whole, farm products have made up about four ninths of the total exports. Adding forest products the proportion becomes roughly half. In the last two or three years these two groups have fallen to about 40 per cent of the total. The remainder consists chiefly of manufactured goods, either ready for consumption or partly finished. There is a relatively small volume of raw mineral products, such as coal and crude oil, but most of the minerals exported as such have been transformed in some measure by the factory processes of smelting and refining. A large part of the agricultural and forest products exported have also been subjected to simple manufacturing processes.

The ranking of the major economic classes in export trade for the years 1926-1928 is indicated by Fig. 89. The food-

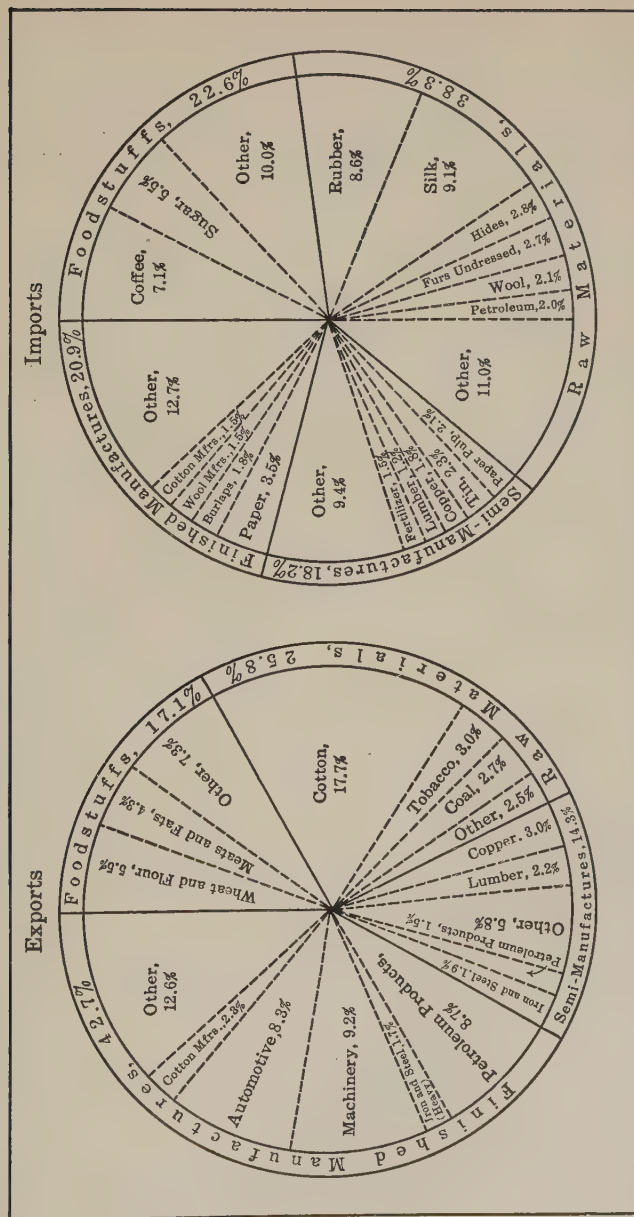


Fig. 89. Percentage distribution of the United States foreign trade by economic classes and major commodities, 1926-1928 average

stuffs group is self-explanatory. Of the raw-material exports about seven eighths are the product of the farms; cotton is overwhelmingly dominant, and tobacco a big item. The semi-manufactures are mainly of forest and mine origin; lumber and unwrought metals (mainly nonferrous) are the largest items. Foodstuffs made up somewhat over one sixth of the total sales abroad during these three years, raw materials somewhat more than one fourth, semi-manufactures one seventh, and finished manufactures considerably over two fifths. Fig. 89 fails to show the full importance which finished manufactures (nonfood products) have now attained in American export trade. The proportion which they contribute to the total has advanced in almost every year since the war; in 1928 it reached 45 per cent, and in 1929 nearly half.

All these economic classes are heavily represented in American imports, but for the most part the specific commodities in each class naturally differ from those in the corresponding group of exports. Farm and forest products form a much larger proportion of imports than of exports, chiefly because of immense purchases of silk, rubber, sugar, and coffee. Such products make up the bulk of the foodstuffs and raw-material imports and are a major factor in the imports of semi-manufactures. They are for the most part exotic — commodities which the soil and climate of the United States scarcely enable it to produce. Finished manufactures are relatively much less important in American imports than in exports. In the import trade of the last few years foodstuffs represent between one fifth and one fourth, crude materials approximately three eighths, and semi-manufactures and finished manufactures each in the neighborhood of one fifth.

Fig. 90 and Fig. 93 show the major individual items both of exports and of imports. It will be noted that certain groups of commodities, such as heavy iron-and-steel products and petroleum products, are divided between the economic class of semi-manufactures and that of finished manufactures.

SECTION 6. WHAT AMERICA EXPORTS, AND WHY

The United States, like the rest of the world, chiefly exports goods which it can produce to better advantage than other countries; it imports goods which other countries can produce more cheaply. The principal factors affecting comparative costs are the character of natural resources, specialized aptitudes and skill, and the standard of wages. The rate of wages is much higher in the United States than in most other countries; therefore the country cannot produce cheaply articles which require a large amount of hand labor and in which natural resources and capital play little part. Of such articles it exports practically none and imports a good many. Many American exports find their explanation in such "natural" factors as abundance of land, climatic conditions peculiarly favoring certain crops, or rich deposits of minerals. Other articles enter the export list by reason of "human" factors characteristic of American industry — notably, large use of machinery, special inventive skill along certain lines, and mass production made possible by the enormous domestic market.

The relative part played in American export trade by natural factors as against human factors may be judged, though only roughly, from the comparative magnitude of the four great economic classes of exports already discussed (see Fig. 89). Foodstuffs, crude materials, and semi-manufactures are classes in which natural advantages count heavily in favoring export. Even here, however, the human factors contribute materially. In the case of most finished manufactures, which made up about half the exports in 1929, the human factors — the methods of production — have most to do with the ability of the country to sell abroad. Nevertheless the export of certain of these finished goods is greatly aided also by the cheapness of the raw materials entering into them. A consideration of major individual items will make clearer these relations of cause and effect in the export trade (see Fig. 90).

AVERAGE ANNUAL EXPORTS, IN MILLIONS OF DOLLARS

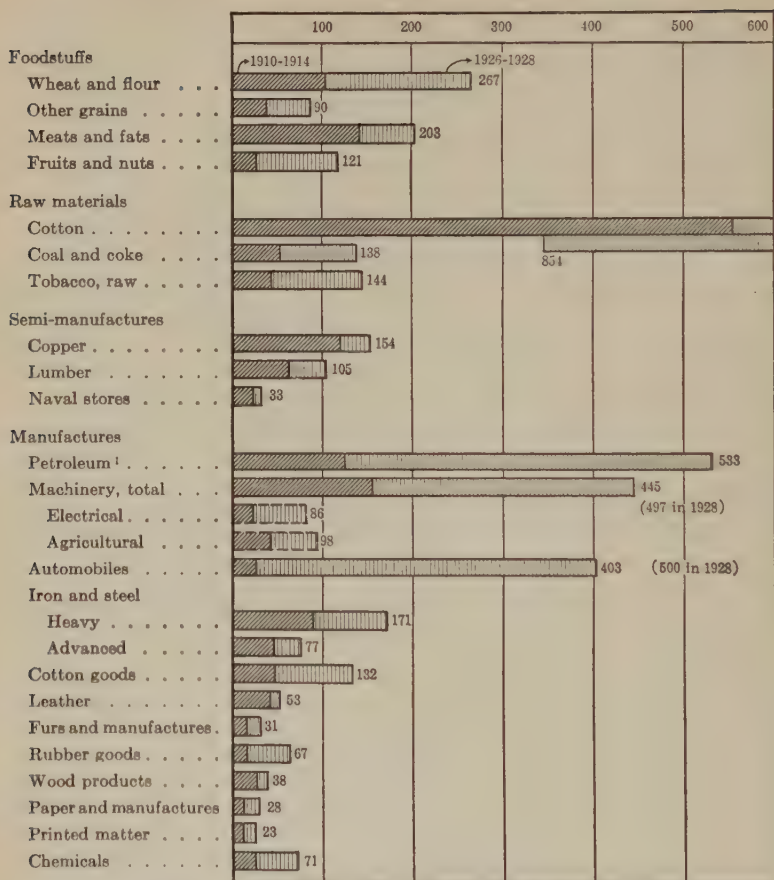


Fig. 90. Diagram showing the value of the major commodities exported from the United States in 1910-1914 and 1926-1928

The heavily shaded section of each bar shows the average annual exports for the period 1910-1914, and the total length of the bar represents the average for 1926-1928. The items are grouped according to major economic classes, but several of them include in part commodities belonging to a different economic class from that under which they are placed (herein the basis is different from that in Fig. 89, where such items are broken up). Thus, copper includes a small amount of finished manufactures, and petroleum products and heavy iron and steel include considerable amounts of semi-manufactures. The increases since prewar years are in most cases partly due to higher prices; automobiles and rubber goods constitute exceptions.

Different commodities show decided differences in the ratio of increase in price

¹ Chiefly refined oils, but including crude oil, paraffin wax, and other non-liquid products.

Cotton may have to dispute with corn the crown among America's farm products, but it is easily king among its exports. In recent years this country has on the average sent overseas more than \$800,000,000 worth of cotton annually, representing over one sixth of the total exports of United States products. The abundance of land permits us to devote a great area to cotton without sacrificing domestic food supplies. Moreover, the South is so peculiarly adapted for this peerless textile that the country would doubtless continue to export large quantities even though it should have to bring breadstuffs from foreign shores. It can scarcely be said that the application of peculiar skill of brain or hand has had much to do with making the United States the world's purveyor of cotton; specialized and large-scale machinery is used less in raising it than for most other crops.

Again, abundance of land, together with special adaptation of soil and climate in certain regions, accounts in great part for this country's large but just recently declining exports of pork products, major derivative of corn. The same is true of tobacco and of certain fruits. In the export of wheat, rye, and barley the United States has no natural advantage over many other countries except relative abundance of land. In these exports its ability to compete against lower-paid labor in other countries is in large part due to the use of much labor-saving machinery and to relative expertness in methods of production.

In most of the years from 1870 down to 1928, inclusive, petroleum and its derivatives ranked next to cotton in the American export trade. Of late they have contributed about one tenth of the total value. This trade reflects both natural factors and human factors. Unmatched gifts of nature; extraordinary technical efficiency in discovering the hidden treasure, coaxing it from the earth, and refining it; limitless supplies of capital; and operation on a huge scale,—all these make for low costs of production. Other important exports which find a similar dual explanation include copper, lead, and zinc. Great quantities of the first

and considerable quantities of the other two are sent abroad with no further elaboration than smelting and refining, in which state they are classed as semi-manufactures. Abundant deposits of high-grade ore are also a material factor in America's considerable exportation of heavy iron and steel products. It is noteworthy, however, that the United States exports very little iron ore as such, and also very little unwrought iron and steel. Even the exports of this group classed as semi-manufactures have mostly been subjected to rolling processes. Most of the export of steel-mill products would be impossible but for the low manufacturing costs due to great investment of capital, to highly specialized machinery and methods, and to mass production.

Coal is a considerable item in the export trade. Coal-mining in the United States is not remarkable for its efficiency; indeed, no country of the world has much to boast of with respect to this industry. Even with America's exceptionally rich coal deposits it is scarcely able, except when strikes or other abnormal conditions disturb foreign mines, to compete in general world markets with European coal produced by much lower-paid labor. Naturally large quantities are shipped to the country's next-door neighbor Canada. Lumber and naval stores are other important commodities which appear in the export list chiefly by reason of rich natural resources.

The most typical example of an export commodity in which human factors primarily explain the dominance of the United States in the world market is the automobile. This new star is now outshining petroleum in foreign sales. American overseas shipments of automobiles, parts, and related products reached in 1928 an even half-billion dollars, representing 10 per cent of the entire export trade. In 1929 the total was considerably larger still. The possession of iron, copper, lumber, and other raw materials gives this country little if any advantage over any other country in building motor cars; but unstinted use of capital, extraordinary technique in designing cars and the machinery to

make them and in organizing production and distribution, highly expert labor, and production on an enormous scale have made the United States automobile-builder to the world. Exports of American cars all but outnumber the combined output of all other countries whether for their home markets or for exportation. This development has brought with it big foreign sales of automobile tires, but here severe competition is encountered, especially from France.¹

Machinery, together with electrical apparatus and agricultural implements, contributed in 1928 almost five hundred millions to American export trade, and in 1929 the total was about six hundred millions. The causes which explain the foreign sales of motor cars apply here in equal measure. The machines shipped in largest volume are commonly called "American specialties" by the foreign buyers themselves. Notable among these are typewriters, adding and tabulating machines, cash registers, sewing machines, tractors and harvesting and other agricultural machinery, mining, excavating, and road-making machinery, printing machinery, and electrical apparatus — especially, of late, radio apparatus. In several of these fields the United States is almost without competition from Europe. American typewriters were used in the office work of the recent British Empire Exposition, the primary object of which was to promote the sale of British goods. Of certain articles of this class, which even nations of relatively low buying power find it necessary to use in large numbers, exports represent a large proportion of the total American output — approximately two fifths in the case of typewriters and one fourth in the case of sewing machines.

Many less important articles similarly find their place among the exports of the United States by reason of special American inventions and production methods. Among these may be mentioned boots and shoes, cigarettes (made at low

¹ Tires are the principal component in the item of rubber goods shown in Fig. 90.

cost by ingenious automatic machinery), photographic apparatus, phonographs, sport articles, watches, various metal specialties, and certain medicinal and toilet preparations. Articles of this sort make up in the aggregate a very large value in the trade.

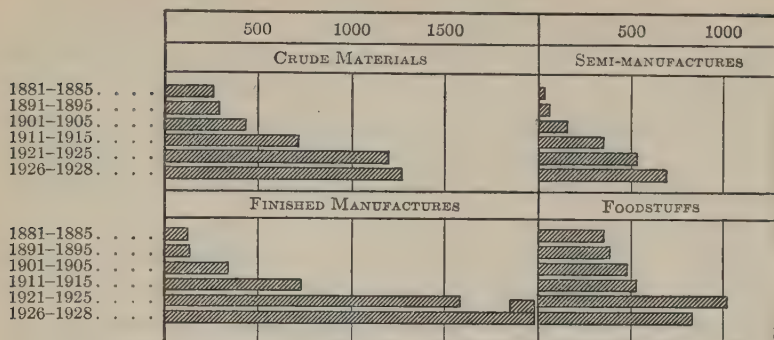
Among the export commodities there are, of course, a good many in which America has little advantage either in resources or in methods. In other cases its advantages in these respects are largely or completely counterbalanced by lower wage scales elsewhere. Among farm products wheat and pork are subject to the most severe competition; among mineral exports, coal. Important manufactures which must compete vigorously for foreign markets are textile goods, leather, rubber goods, the heavy iron and steel products, lumber, and certain classes of chemicals.

SECTION 7. CHANGES IN THE COMPOSITION OF EXPORT TRADE

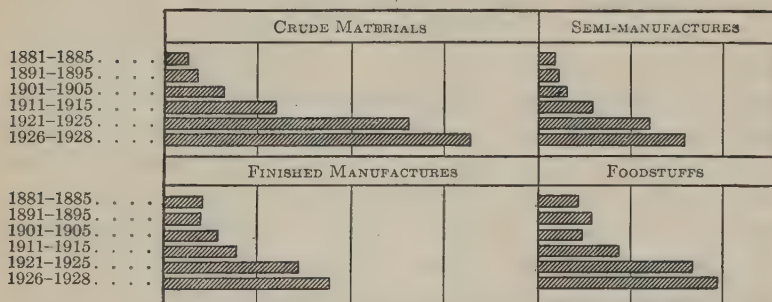
The changes in the character both of its exports and of its imports reflect, very naturally, the gradual shift of the United States from a country primarily agricultural to one with a highly advanced manufacturing industry. It now sends out relatively much less and brings in relatively much more of agricultural and forest products than formerly. Conversely, it sells abroad relatively more manufactured products and buys abroad less.

If we go back to colonial days we find tobacco the principal export of the new country. Later on tobacco yielded first place to that other and more wonderful staple of the South, cotton. From about 1830 down to 1870, save when the Civil War interrupted its flow to the hungry spindles of Lancashire and Saxony, cotton contributed more than half the value of American exports. With the opening of the vast prairies of the Middle West, wheat and pork and other food-stuffs began to pour out to feed Europe's millions. Ever since, with varying fortune, that region has disputed with the

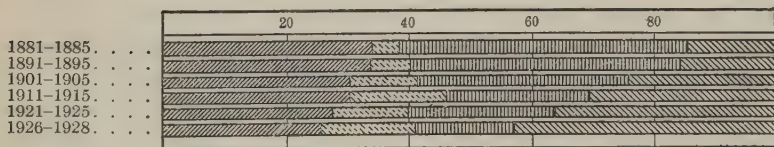
A. AVERAGE ANNUAL EXPORTS, IN MILLIONS OF DOLLARS



B. AVERAGE ANNUAL IMPORTS IN MILLIONS OF DOLLARS



C. PERCENTAGE OF TOTAL VALUE OF EXPORTS



D. PERCENTAGE OF TOTAL VALUE OF IMPORTS

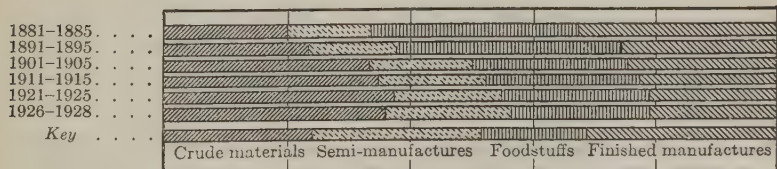


FIG. 91. Diagram showing changes in the economic classes of exports and imports

The increases shown since 1891-1895 are partly due to advance in prices. The figures for exports do not include reexports of imported goods, which are of minor importance

South the primacy in agricultural exports. Still later the industrial East, from the beginning chief purveyor of manufactured goods to the home market, came into the export field. As manufacturing and mining have spread out into the South and into the newer states, they too have contributed increasingly to the export of nonagricultural commodities.

Half a century ago farm products constituted about four fifths of the value of American exports. Even as late as the closing years of the nineteenth century the ratio was almost two thirds. Thereafter, until 1917, the decline in proportion was almost unbroken. Indeed, during much of this time foreign shipments of foodstuffs fell off absolutely. The better lands of the West had now been taken up, and further expansion encountered difficulties of soil and climate. The growth of population was demanding for home consumption a larger share of the output of grains and meats. Cotton and tobacco exports, however, continued to increase at a fairly rapid pace. Just before the World War the products of the farm made up somewhat less than half the total export trade. The stimulus of war prices and the patriotic effort of the American farmer to do his bit for the Allied cause brought an immense expansion of the export of foodstuffs. The foreign demand for American cotton, however, was diminished rather than enhanced by the war.

The increased acreage of wheat continued for some time after the war. The prices of cotton in certain recent years have been high. The exports of pork products (lard now dominating) still remain above prewar levels, though for several years past they have fallen off markedly. The quantitative volume of products of the farm in the export trade has held up well; during the three years 1926 to 1928 it averaged over 20 per cent greater than in the five-year period preceding the war. Other exports, however, have grown much more. During these three years the products of the farm constituted about 38 per cent of the total value of exports as compared with 49 per cent before the war.

The fact that agricultural products form a much smaller share of American exports now than they did half a century ago is far from indicating the pinch of a scarcity of land. The United States, despite steadily mounting population, is not less self-sufficing than before in basic products of the soil. It does not have to import farm products that formerly appeared among its exports. Indeed, the problem of the farmer in recent years has been to find markets for his surplus. If the export of farm products continues to remain stationary, as since 1922, it will be by reason of increasing production at low costs in other countries and not because of any inability of the United States to produce beyond domestic needs.

Many of the exports listed as agricultural have been subjected to manufacturing processes, and part of their value is due to those processes. The ratio between the value of agricultural exports, as set forth in the customary statistics, and the total value of farm products therefore exaggerates the relative importance of the exports, but the changes in the ratio reflect the true trend. This ratio probably reached its maximum during the last decade of the nineteenth century. It then stood in the neighborhood of 25 per cent. During the five years immediately preceding the war it had fallen to about 15 per cent. For the five years 1921-1925 it averaged a little higher, and since then a little lower. Excluding the cost of manufacturing processes and of transportation to the seaboard, it is estimated that exports of farm products in the last two or three years have represented about 12 or 13 per cent of the value of the output of the farms.

Growth in Exports of Manufactures

Especially since about 1895, American exports of manufactures have grown enormously. The group designated as finished manufactures constituted less than one sixth of the total exports fifty years ago. From 1926 to 1928 it accounted for 42.7 per cent of the total and in 1929 for almost half.

Allowing for higher prices, the United States exported in 1929 (roughly) twenty times as much of manufactured goods as during the later seventies, — seven or eight times as much per capita. Exports of semi-manufactures have also grown rapidly. Down to the outbreak of the World War the share of this class in total exports was steadily advancing. The fact that it now forms a somewhat smaller proportion is due in part to the depletion of the forests, which furnish an important fraction of the semi-manufactured exports. Moreover, copper, the biggest item in this class, was until late in 1928 somewhat lower in price than during prewar years, in sharp contrast with most commodities. This difference has appreciably affected the share of semi-manufactures in export trade.

The growing importance of manufacturing industry as a contributor to export trade is not fully brought out by the group statistics, for the manufactured articles sent abroad have become more and more highly elaborated. Capital and labor count for more in their production and the original gifts of nature for less. Thus in the period 1876–1880 refined mineral oils represented more than a third of the total exports classed as finished manufactures. These oils are for the most part derived by a comparatively simple and inexpensive transformation; this was especially true in the earlier days. Exports of petroleum products have increased immensely, yet (excluding those classed as semi-manufactures) they form a decidedly smaller proportion of the manufactures class than formerly — about 19 per cent in 1926–1928. Sawmill products, which also involve relatively simple transformation, are listed in the class of semi-manufactures. They have shown a similar history to that of refined mineral oils. The annual average foreign shipments of petroleum products (including those classed as semi-manufactures and also crude oil in moderate volume) were about twelve times greater in value from 1926 to 1928 than from 1876 to 1880. Sawmill products were about thirteen times greater. In contrast, exports of machinery multiplied nearly fifty times, of vehicles

at least a hundred times, of rubber goods over two hundred times, and of the heavy iron and steel products over a hundred and forty times.

It is the fashion of many Europeans and of some Americans to attribute to the World War a major rôle in the expansion of American export of manufactured goods. No doubt the share of the United States in the international trade in such goods is larger today than would have been the case had there been no war; but the absolute growth would perhaps have been greater without the conflict. Exports of finished manufactures in the three years ending June 30, 1914, were 166 per cent more in value than in the three years ending June 30, 1900. In the three calendar years 1926 to 1928 they were 185 per cent more than in the fiscal years 1912 to 1914. Taking into account changes in prices, the increase in the slightly longer later interval was, if anything, less than in the earlier.

The World War cut down the buying power of the great majority of countries. Europe's production and trade fell enormously. Unable to sell to Europe as much as usual of their raw materials and foodstuffs, Latin America and the Far East had less wherewith to buy manufactured goods. It was not until 1925 that the total foreign trade of the world reached its prewar volume (allowing for changes in prices). But during the war and for several years after its close Europe was in no position to furnish its share of this restricted world demand. The industries of the United States had been deranged by the war, but to no such extent as those of Europe. Immediately after the war they swung upward with extraordinary vigor. They had to fill the gap left by Europe's débâcle in production. Had there been no war both Europe and the United States could have continued that steady increase in export of manufactured goods which both had been experiencing for a long time before.

Equally mistaken is the common opinion that the United States is becoming in larger and larger measure dependent on foreign outlets for its factories. Exports represent but a

small fraction of the total output of American manufacturing industry, and that fraction is now not larger than it was before the war (Fig. 92), though in the last few years it has tended upward.

Exports of manufactured goods (including those partly finished, but not manufactured foods) in 1927, the year of the last census of manufactures for which the data have

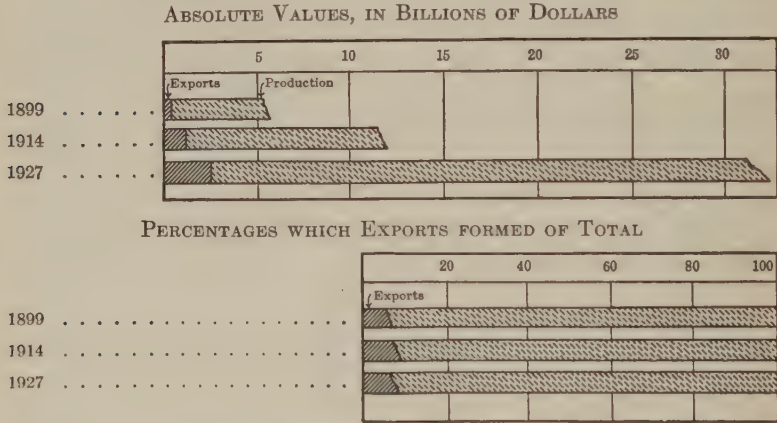


FIG. 92. Diagram showing the relation between production and exportation of manufactured goods other than foodstuffs

The net value of manufactured goods, exclusive of duplication due to the use of the products of one factory as material for another, has been estimated (the approximate character of the estimate is indicated by the irregular ends of the bars) and compared with the value of exports of semi-manufactured or fully manufactured commodities. The causes affecting the production and export of foodstuffs are different from those affecting most other manufactured goods, and they are therefore excluded

been published, amounted to a little less than \$2,700,000,000. This is a big sum, but the total value of American factory output is many times bigger. Apart from foodstuffs and from the extensive duplications, it is in the neighborhood of \$31,000,000,000. Thus exports represented about $8\frac{1}{2}$ per cent of the total. American industry would by no means go on the rocks if foreign outlets were shut off altogether. Although the ratio of exports to domestic production of factory goods has been rising in the last few years, and may by 1929 have reached 10 per cent, it is even now not

higher than in 1914, and not very much higher than at the beginning of the century.

As has already been noted, there are many individual articles of American manufacture which are exceptions to the general rule — articles of which the exports form a large and increasing proportion of the production. A number of industries, makers of specialties popular the world over, now find their prosperity in large measure dependent upon foreign outlets. Moreover, during the last few years exports of manufactured goods have been increasing decidedly faster than domestic production, and it is very likely that this tendency will continue, though there is no probability that the United States will in any measurable time send abroad as large a share of its factory output as do the industrial nations of Europe.

SECTION 8. AMERICAN IMPORT TRADE

The high standards of consumption in the United States account not merely for the magnitude but also for the character of its import trade. Americans ransack the earth for any commodity, common or rare, cheap or dear, that can add to the satisfaction of life or to the efficiency of industry. Poorer peoples have to do without many of these things or to buy them in far smaller quantity.

Natural factors have fully as great an influence in the import trade as in the export trade. Tropical and semi-tropical products are conspicuous among the nation's purchases from overseas. It seeks abroad a number of minerals not found within its borders. It supplements domestic supplies of certain animal and forest products with imports from more thinly settled countries. On the other hand, human factors are by no means absent. The fact that in many countries wages are much lower than in the United States accounts for the importation of many articles in which hand labor is a large element of cost. Others find their place in the list because of the special aptitude and experience of foreigners in manufacturing them.

During recent years rubber has held pretty much the center of the import stage. The enormous increase in consumption and the violent fluctuations of the price, influenced by restrictive policies of certain producing countries, have focused public attention and led to international discussions. In 1929 the United States imported about a billion and a quarter pounds of rubber. In 1926 rapidly mounting prices had brought the cost of rubber imports up to \$506,000,000, more than one ninth of the total value of imports, and exceeding any other item. Lower prices since have cut this total in half and again brought rubber down to third or fourth place among American imports, but the increase in the quantity of rubber brought in is so rapid that it may regain the ascendancy sooner or later even on the basis of a moderate price level. Unless some synthetic substitute is found, the United States will continue to be dependent on the tropics for this, perhaps the most indispensable of its imports. There is some consolation in the fact that the consumption of two thirds of the world's rubber reflects a wealth which brings the automobile within the means of a large majority of American families. Moreover, should war cut off supplies the country could for a time get along with greatly reduced quantities.

Coffee, another semitropical product, normally ranks among the first three or four American imports. With minor exceptions, the United States consumes more coffee per capita than any other country; it takes about half the world's output. Fruits (notably bananas), nuts, and cocoa are other large imports from tropical lands which fall in the class of luxuries or semi-luxuries. Various oil seeds, oil nuts, and vegetable oils which the temperate zone cannot produce are also brought in; these are used chiefly for making soap and for other technical purposes, but also to some extent for food. From the tropics come several textile fibers for rope, bagging, mats, binding twine, and other special uses. These include jute (imported mainly in the simply manufactured form of burlaps), manila hemp (abaca), sisal, and kapok.

AVERAGE ANNUAL IMPORTS, IN MILLIONS OF DOLLARS

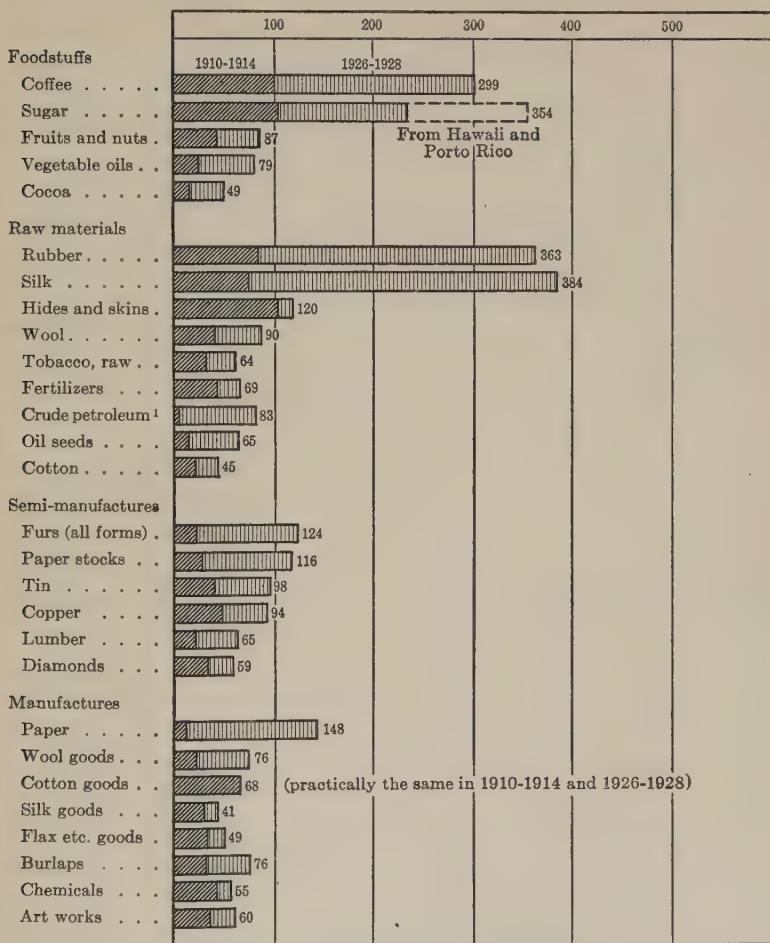


FIG. 93. Diagram showing major commodities imported into the United States in 1910-1914 and 1926-1928

The heavily shaded section of each bar shows the average annual imports for the period 1910-1914; the total length of the bar represents the average for 1926-1928. Certain of the items entered under a given group include a limited amount of commodities belonging to some other group. The increase in value for most commodities is partly due to higher prices, rubber being an exception

¹ Not including semifinished and finished oils, the average value of which for 1926-1928 was \$40,000,000.

Somewhat different are the circumstances that give silk and sugar a conspicuous place in the import trade. Cane sugar is a product to which only a small fraction of the area of the United States is adapted, but the sugar beet can be grown readily in large sections. Beet production, however, calls for much toilsome hand labor. The country consequently finds it more advantageous to let the tropical suns and the lower-paid workers of Cuba, Porto Rico, Hawaii, and the Philippines furnish the greater part of its sugar. In Fig. 93 sugar from Hawaii and Porto Rico is shown by dotted lines; adding this to the takings classed as imports brings the total up to from \$300,000,000 to \$400,000,000 a year. The value varies considerably with the ups and downs of prices.

The silk which gladdens the raiment of almost every American woman comes chiefly from low-wage Japan and China. The imports of the United States are two or more times the consumption of all other countries taken together; silk is usually the biggest item in the import list. Nothing prevents America from producing silk except the great amount of hand labor involved. Apparently the same is true of tea.

Although the United States exports nearly as much tobacco as all other countries together, it also imports many million pounds annually. The flavor of tobacco depends in a unique manner upon soil and climate. The tastes of users are capricious, and self-indulgent Americans seek in widely separated regions of the world the particular types they fancy.

Of much importance are the imports of wool, hides and skins, wood pulp, and newsprint paper. These are by no means exotic products. The United States produces large quantities of all of them and could, were it profitable, furnish the whole of its great requirements. But this would involve the sacrifice of other things which American soil raises to greater advantage. For these are peculiarly the products of thinly settled countries where land and forests are even more abundant than in America. It pays to seek wool and hides and skins from the semiarid pastures of Australia or Argen-

tina rather than to devote more land to grazing than is necessary for supplying the population with meat. It is cheaper to let Canada's virgin forests feed the hungry printing presses than to reforest the cut-over areas of the United States. For the same reason much lumber is imported from Canada. This comes chiefly to parts of the country distant from the present centers of domestic production, and those centers in turn ship still greater quantities of lumber overseas.

Finally, the United States requires several minerals which do not appear even among its highly varied resources or which it can produce only at a cost prohibitive in times of peace. The largest and most essential mineral item is tin, coming mainly from southeastern Asia. But the next biggest is diamonds, though smuggling hides the full importance of these. Originating chiefly in South Africa, and cut by the age-inherited skill of Amsterdam and Antwerp, the world's diamonds find more than half their total market in America. How could Cupid (to quote Herbert Hoover) carry on his archery without their potent aid? The United States is also a large importer of pearls. Nickel, manganese, chromite, cobalt, vanadium, and tungsten, though small items in point of value, are of importance because of the use they serve in alloying iron for special industrial uses. A much larger import, in value as well as in tonnage, is sodium nitrate. Up to the present stage of development in processes it has been cheaper to bring this from Chile than to fix nitrogen from the air. Nitrate is an essential for explosives as well as for fertilizer (it is included under fertilizers in the diagram). Mainly to strengthen Southern soils for raising cotton, the country also imports potash, which it cannot produce from its own deposits at reasonable cost.

There are three minerals of which the United States is itself the world's greatest producer and exporter but which it nevertheless imports in large quantities. These are petroleum, silver, and copper, brought chiefly from Mexico, Chile, Venezuela, and Colombia. American capital owns many of

the oil wells and mines of those countries. These minerals are for the most part imported in crude form and refined in the United States, thereby adding to its capacity for exporting the more advanced products. Petroleum is by far the greatest import of the United States in weight, though by no means in value.

Most of the imports thus far mentioned are either food-stuffs or materials — raw or semi-manufactured — for American factories. Finished manufactures represent only about one fifth of the import trade. A large proportion of this class consists of fancy and highly elaborated goods involving much hand labor. Even where a given item in the import list bears the same name as one among exports, it usually represents goods decidedly different in type and workmanship. In some cases the fact that America imports such manufactures is explained solely by the low wages of foreign workers. Specialized and long-cultivated skill and taste on the part of those workers and of their employers is often a contributing or even a dominant factor. Familiar types are millinery, lace goods, and fancy apparel. In these Parisian fashion charms the heart of the American woman, and the patient low-paid foreign needle appeals to her purse. Fine cottons and woollens of English looms, linens from Ireland and Flanders, tempt the American consumer despite the tariff duties he must pay. Art works, antique or modern, fancy leather goods, toys shaped with meticulous hand, are other import articles that do not lend themselves to machine methods. German technical research produces many fine chemicals which still find large sale in the United States despite its recent rapid progress in that field.

Changes in the Composition of Import Trade

The changes in the composition of the import trade, like those in exports, reflect the rapid development of American manufacturing industry. They reflect advancing standards of living also. Imports of raw materials have increased by

leaps and bounds (see Fig. 91). Allowing for change in prices, they are about fifteen times as great as half a century ago (1926-1928 compared with 1876-1880). At that time they accounted for about $18\frac{1}{2}$ per cent of the total value of imports; they now comprise over three eighths. The change corresponds broadly with that in the proportion of finished manufactures in exports. Increasing wealth has permitted the country to seek abroad greater and greater quantities of rubber, silk, and other exotic materials, many of which partake more of the nature of luxuries and semi-luxuries than of downright necessities.

Along with the great increase in raw-material imports has gone a relative but by no means absolute decline in the importation of finished manufactures. This class now represents only about one fifth of the total imports as against three tenths fifty years ago. Imports of semi-manufactures, which possess an intermediate economic character, show an intermediate rate of growth as well. They now form a decidedly larger proportion of imports than fifty years ago, but not much larger than twenty-five years ago.

Marked changes in the prices of sugar and coffee have much affected the total value of food imports. During the last quarter of the nineteenth century the share of food products in American import trade declined markedly. Consumption of coffee and sugar normally increases somewhat faster than population, but not at such a rate as that of many other commodities. There was little change in the relative importance of foodstuffs during the period from 1900 to 1924. The prices of sugar and coffee had risen more during that period than those of most raw-material imports, thereby tending to offset the relatively slow quantitative increase. In the meantime the United States had been taking much greater quantities of a number of other exotic foods, notably tropical fruits, cocoa, olive oil, and special types of cheese. There was, however, practically no tendency toward importation of those foodstuffs which the American soil, climate, and scale of wages are suited to

produce. Since 1924 the marked decline in the price of sugar has brought the proportion of foodstuffs in the import trade down considerably.

SECTION 9. GEOGRAPHICAL DISTRIBUTION OF TRADE

Modern transportation opens the whole world to trade. American goods find their way to every country, however small or remote, and each contributes to America's needs. The volume and the character of the trade with the several continents and countries are resultants of the kind of goods that the United States has to sell and the kind of goods that its people wish to buy. It depends too on the standards of living and the productive capacity of the various regions. America's foodstuffs go chiefly to countries overcrowded with people. Its raw materials seek countries which lack special resources that it possesses. Its manufactures find their markets largely in new or backward countries, since these are less advanced in industry. We have already seen how largely geographic causes determine the character of imports. Some are brought from the tropics, others from lands which happen to have mineral or other resources that are lacking in the United States, and still others from thinly settled countries. Europe and Asia send many products of their cheap labor or their specialized skill.

The causal factors in the geography of trade are thus numerous. There are many cross currents. One result of this complexity is that we rarely find a close approach to a balance between value of exports and value of imports in the trade with any individual country (see Fig. 97). Even when entire continents are considered, there is none except Africa with which the trade of the United States anywhere near balances. The exports to Europe and Oceania greatly exceed the imports from them; and there is a considerable excess of exports in the trade with North America and Africa. The country buys from Asia much more and from South America a good deal more than it sells to them.

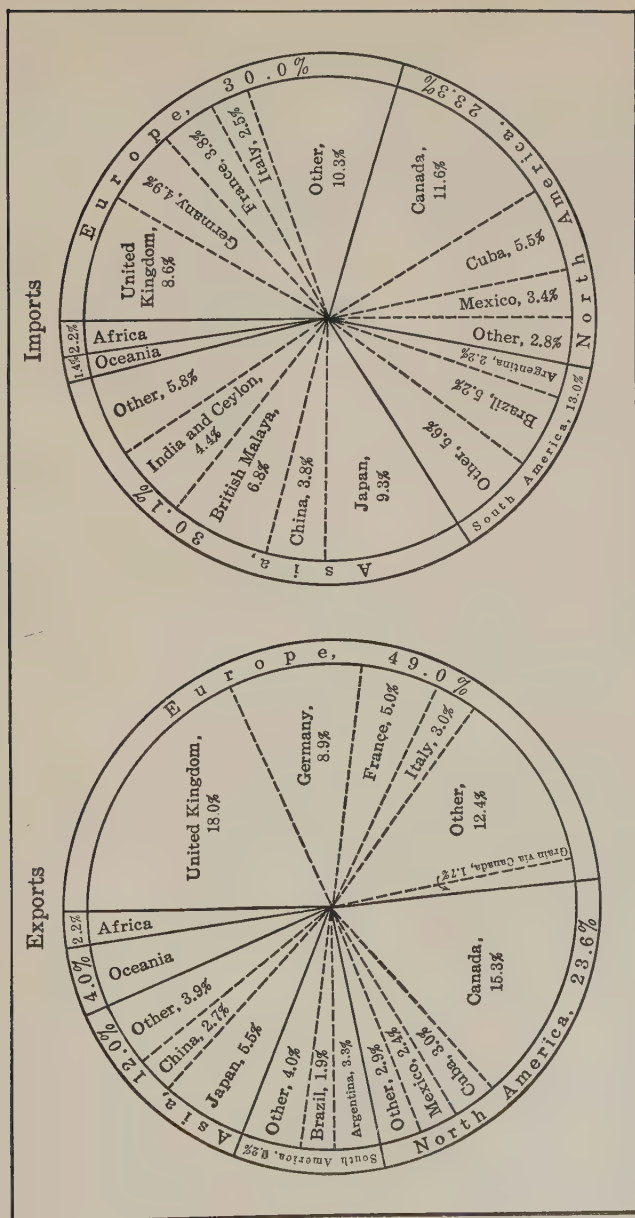


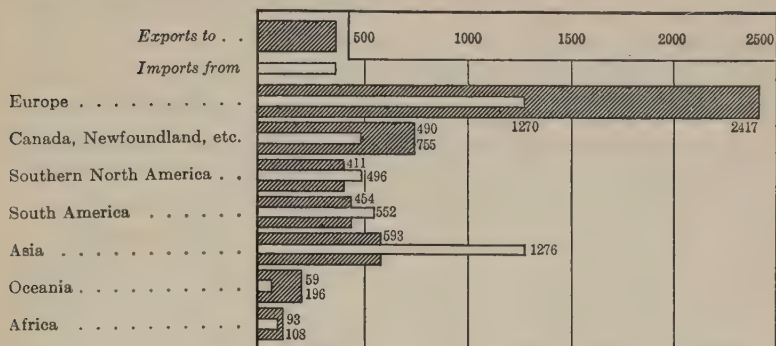
Fig. 94. Diagram showing the distribution of export and import trade by continents and principal countries during the period 1926-1928

As a destination of American exports Europe, the seat of a great population of relatively high standard of living, stands first. North America stands second ; its next-door neighbors naturally trade chiefly with the United States. Then follows Asia, home of vast numbers, but little advanced in industry. Fourth comes South America, thinly peopled and also with meager manufacturing industry. Last, very naturally, stand Oceania and Africa, the least populated among the continents. In proportion to the number of their inhabitants the order is decidedly different, North America ranking first, followed by Oceania, South America, Europe, and Asia. In absolute value of imports furnished to the United States during recent years Europe and Asia have run a close race, each furnishing 30 per cent of the total, with North America, South America, Africa, and Oceania following in order (see Figs. 94 and 95).

Even since the war, with its disastrous slash into Europe's productive capacity and buying power, that continent has in most years taken more than half the exports of the United States (the proportion, however, has recently fallen slightly below half) and has furnished three tenths of its imports. Europe receives nearly three fourths of all the foodstuffs and over two thirds of all the raw materials that this country sells abroad. It should be noted in this connection that the published statistics of trade understate the importance of Europe as a market and overstate that of North America. The reason is that great quantities of grain (the value averages nearly \$100,000,000 annually) are shipped to Europe through Canada, but since the exporter does not at the time know the actual country of destination these shipments are credited to Canada. In the diagrams in this chapter this grain is treated as an export to Europe. Since Europe itself is a great center of manufacturing industry, it takes a smaller proportion of American exports of finished manufactures ; nevertheless it rivals and in the last few years leads North America as the major market for such exports. Among manufactures sent to European

A. VALUE OF EXPORTS AND IMPORTS, BY CONTINENTS

ANNUAL AVERAGE 1926-1928, IN MILLIONS OF DOLLARS



B. CHARACTER OF TRADE WITH EACH CONTINENT IN PERCENTAGES

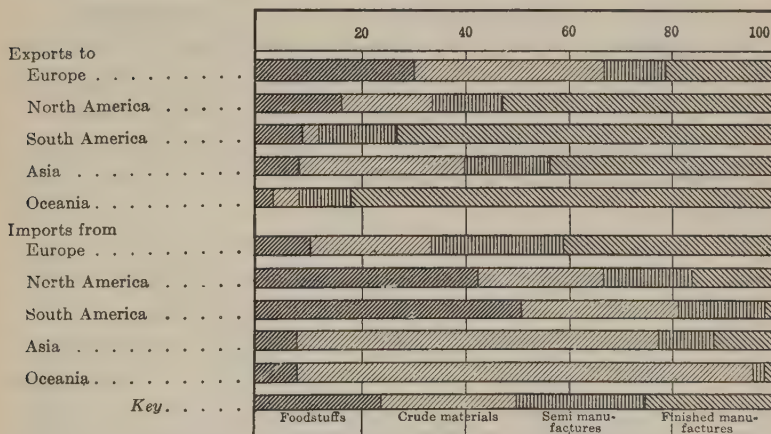


FIG. 95. Diagram showing the amount and character of the trade of the United States with the several continents

Section A is self-explanatory. Section B relates to the average for the years 1921-1927 and shows for each continent the proportion of the trade consisting of each of the four great economic classes. For example, of the exports to Europe 30½ per cent consisted of foodstuffs. Export figures include the small reexports of foreign goods in section A, but exclude them in section B. Exports to Europe and Canada are adjusted to show the actual destination of the grain which is shipped from the United States through the Canadian ports (see text)

countries petroleum products, machinery, automobiles, and other "American specialties" are the leading items. Fig. 95, *B*, shows by percentages the character of the trade with each continent.

As might be expected, Europe furnishes the United States far more finished manufactures than any other continent; in fact, about three fifths of the total imports of this class. It also supplies a large fraction of American imports of semi-manufactures. Two thirds of the goods taken from Europe fall in these two economic categories. Naturally enough it ranks low in the supply of crude materials and foodstuffs to the United States.

To the North American countries as a group the United States sends not far from one fourth of its exports, and from them it draws nearly the same share of its imports.¹ With respect both to the balance of trade and to its make-up, a distinction must be drawn between the great neighbor country to the north and the Latin countries and islands to the south. Exports to Canada materially exceed imports from that country (although the disparity is becoming less marked). The opposite is true of the Latin part of the continent.

The Canadian people are much like those of the United States in characteristics and standards of living; but the country, being as yet thinly peopled, is less developed in industry, and therefore buys from the United States a great quantity and variety of manufactured goods. Canada also takes cotton, coal, and various foods and raw materials which climate and resources do not enable that country to produce. The United States furnishes this close neighbor about two thirds of all its imports. From Canada it imports chiefly forest products, hard wheat for improving flour, and certain minerals, notably nickel.

¹ Trade with Alaska is not included in the statistics. The shipments to Alaska from the main body of the United States are valued at from \$30,000,000 to \$35,000,000 annually, and the movement in the opposite direction (mainly fish, copper, and gold) at from \$60,000,000 to \$80,000,000.

The economic life of the Latin peoples of the North American continent is less advanced. To them also the United States sells mainly manufactured articles, but these are less varied and of cheaper type than those that go to Canada. Foodstuffs form a considerable part of the shipments to this region, especially to the West Indies. Tropical food products and fibers are dominant in the imports from the southern countries of North America. Sugar from Cuba is an immense item. Crude petroleum, copper, and other minerals are major imports from Mexico. Porto Rico, as a possession of the United States, is not included in the statistics of foreign trade. In the last few years the shipments from the mainland to the island have averaged about \$85,000,000 yearly, and the reverse movement, in which sugar and tobacco dominate, somewhat more.

The balance in the trade with South America, taken as a whole, is considerably against the United States, although several countries, including Argentina, are exceptions. Sales to South America are rapidly increasing and now make up over 9 per cent of the total export trade. In turn it furnishes one eighth of all the imports. The trade with South America is somewhat similiar in character to that with the Latin countries of North America, though sugar plays hardly any part in it. The continent has slight need for imported foodstuffs, and its industries are too little developed to call for much of the raw materials of the United States. The bulk of the exports to South America consists of finished manufactures, and semi-manufactures make up most of the rest. Food products vie with crude and partly manufactured materials in the imports from that continent. The former are chiefly tropical or semitropical, coffee predominating. Among the nonfood imports on the other hand, tropical commodities are of minor significance, the leading items being wool, hides and skins, nitrates, and copper.

Mainly because of the immense increase in American consumption of rubber and silk, Asia is a great source of imports.¹

¹ Trade statistics include the Philippines with other Asiatic countries.

Only in exceptional years have the exports to Asia equaled half the imports in value. During 1925 and 1926 the United States imported goods from Asia to a greater value than from Europe owing to the abnormally high price of rubber, but since then Europe has been slightly in the lead. Most countries of Asia are as yet little developed in manufacturing industry. Finished manufactures therefore make up approximately half the American sales to that part of the world. However, with the rapid industrial advance of Japan the United States has been sending that country more and more crude and semi-manufactured commodities, especially cotton and steel. Owing to its dense population the Asiatic continent is able to export little of foodstuffs, even those which for the United States would be exotic. About two thirds of the imports from Asia are crude materials. These comprise numerous tropical and semitropical products, the most important being rubber, jute (including burlaps) and other fibers, copra and other coconut products, shellac, China-wood oil, and other gums and oils. In most years, however, one import, silk, is about equal in value to all these other commodities combined; in 1925 and 1926 rubber, owing to inflated prices, outranked silk, but rubber has again fallen to second place. Tin is the principal mineral imported from Asia.

American exports to Oceania, although not very great in absolute value because of the small population of that region, have rapidly increased; they are more than treble the imports from it, since America has no need to buy abroad the foodstuffs which constitute the largest exports of this part of the world. The United States sells to Oceania chiefly manufactured goods. The prosperous English-speaking countries take a wide variety of advanced products, among others many thousands of automobiles. From Australia and New Zealand the United States imports principally wool, hides and skins, and rabbit fur. The smaller islands furnish chiefly tropical raw materials. Hawaii, as an integral part of the United States, is not shown in the foreign-trade statistics. The shipments to and from that territory are large in pro-

portion to the number of inhabitants: in 1928 they were \$78,000,000 and \$117,000,000 respectively. Sugar and pine-apples are the chief products sold to the mainland.

The vast continent of Africa, for the most part thinly peopled by backward races, contributes only a small fraction of the foreign trade of the United States. This trade is mainly confined to the countries along the Mediterranean and to the southern countries of the continent, where Europeans have settled in considerable numbers. Finished manufactures dominate in the exports to Africa, which have grown rapidly in recent years, and raw materials dominate in the imports. Egyptian cotton is the leading import; other important items are palm oil, wool and, just recently, crude copper.

Changes in the Distribution of Trade

The changes in the destination of exports and in the origin of imports (see Fig. 96) have reflected the changes in the economic character of the foreign trade. Europe, primarily importer of foodstuffs and raw materials and exporter of manufactures, is relatively less important in the trade in both directions than formerly. This is the natural result of the declining share of agricultural products in the exports of the United States and of manufactured goods in its imports. Half a century ago more than four fifths of all the sales abroad were destined for Europe. Falling steadily, this proportion reached five eighths just before the war. The blow struck by the war to the European countries accentuated the normal downward trend. American credits, however, helped Europe to continue to take very large quantities of American goods even during the worst years of her postwar depression.

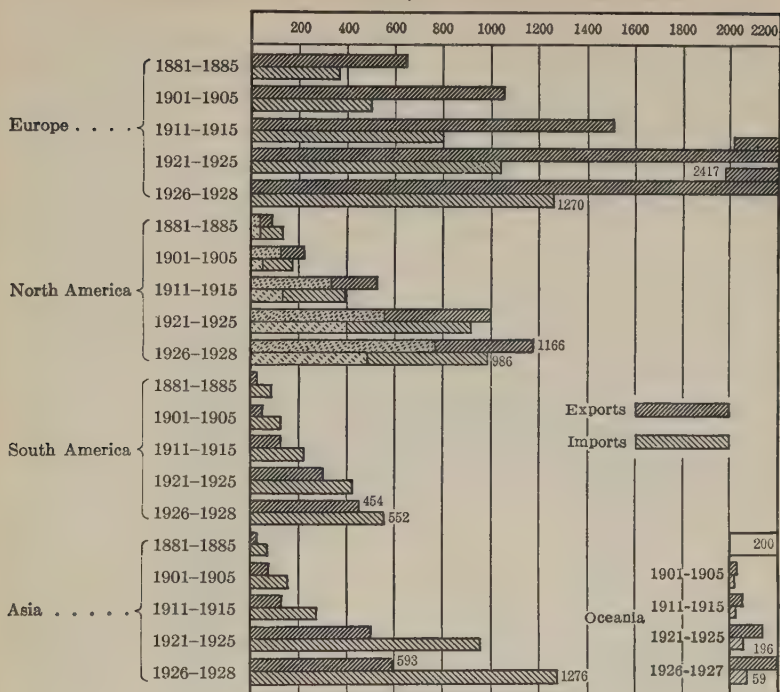
Down to the time when the great conflict cut deep into her productive strength, Europe's share in furnishing imports to the United States declined but slowly. In the seventies and eighties it was from 50 to 55 per cent of the total; in the years immediately preceding the war, a little less than half. All this time American purchases from Europe, chiefly manu-

factured goods, were steadily advancing in absolute amount despite the rapid development of domestic factories. During the war, however, they fell off outright even in terms of values inflated by soaring prices. The trade recovered markedly in actual volume and value after 1921; but, with the rapid advance taking place also in American purchases of raw materials from other continents, Europe's share of the total imports of the United States has shown little change from year to year, remaining at about 30 per cent. Were it not for the fact that prices are much higher than before the war, America's purchases from Europe in recent years would but little exceed their prewar value.

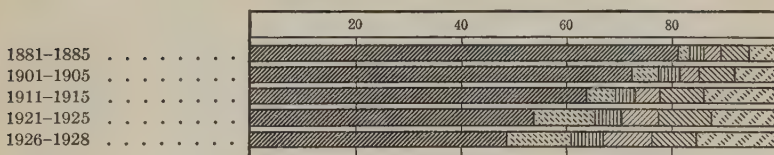
All the other continents have gained relatively as well as absolutely in both import and export trade with the United States during the past half-century, and especially as compared with the period just before the war. Those that have shown the greatest advance are Asia and Oceania. Together they took less than one thirtieth of American exports fifty years ago; from 1926 to 1928 they took nearly one sixth. Their part in the import trade meanwhile rose from one eighth to nearly one third. Asia has been awakening. She is making progress in production and in standards of living. Moreover, she happens to produce several articles that have come into greatly increased consumption in the United States. The gain in the trade with Oceania, especially in exports, reflects the growth of population and wealth in Australia and New Zealand. Trade with Africa, although still small, has increased at nearly the same pace as that with the Far East.

Since the beginning of the present century a marked growth has taken place in exports both to the southern countries of North America and to South America. This region took 9 per cent of the exports in the period 1896-1900, 14 per cent in the period just before the war, and between 17 and 18 per cent in the last few years. Purchases from Latin America have grown steadily but less rapidly. They represent a somewhat smaller share of total imports than half a century ago and about the same proportion as a quar-

A. AVERAGE ANNUAL TRADE, IN MILLIONS OF DOLLARS



B. PERCENTAGE OF TOTAL EXPORTS



C. PERCENTAGE OF TOTAL IMPORTS

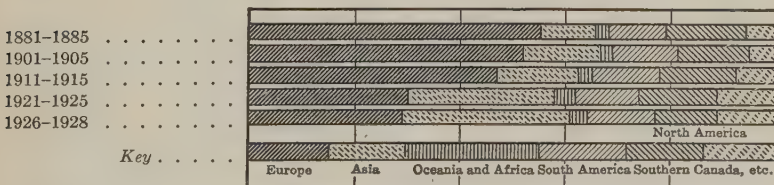


FIG. 96. Diagram showing changes in trade with the principal continents

In the bars for North America in section A the segments to the left, and in sections B and C the segments at the extreme right, represent Canada and Newfoundland. Export figures credit to Europe grain shipped through Canada

ter of a century ago. The consumption of coffee and sugar, the biggest items in this trade, increases gradually, but not by such leaps and bounds as that of Asia's rubber and silk.

Down to about twenty years ago trade with Canada grew more rapidly on the export side than on the import, but since then imports from that country have decidedly outstripped even the markedly growing exports. As the forests of the United States have succumbed to the ax the demand for Canadian lumber and paper has multiplied. Canada took about $8\frac{1}{2}$ per cent of American exports in the period 1901-1905, and in the last few years (even excluding the grain exports credited as going to Canada but actually destined for Europe) the proportion has been about 15 per cent. In the meantime Canada's share in the import trade has risen from $5\frac{1}{2}$ per cent to more than double that proportion.

SECTION 10. TRADE WITH LEADING COUNTRIES

The United Kingdom is the world's greatest importer. Naturally it has been by far the most important single market for American exports until recently, taking immense quantities of foodstuffs and raw materials and even a large volume of manufactured goods. In recent times Britain's share in the exports of the United States has fallen off, but she still purchases nearly one fifth of the total. Canada has only one fifth as many people as the United Kingdom, but she now rivals the mother country as a destination of American exports. Germany ranks third; besides the direct shipments a good deal of what is consigned to Belgium and Holland is reshipped into Germany. That country, however, in turn reships many American goods to interior states of Europe.¹ Other leading countries in the American export trade are Japan, France, Argentina, Australia, Italy, and Cuba, rank-

¹ In the case of a number of the countries of central and eastern Europe the statistics of United States exports are entirely misleading. Owing to the indirect channels of trade they are credited with only a small fraction of their actual purchases of American goods.

ing in the trade averages for 1926-1928 in the order named. The countries that supply the United States with the greatest value of imports are (in the period mentioned ranking in the order named) Canada, Japan, United Kingdom, British Malaya, Cuba, Brazil, Germany, India (including Ceylon), China (including Hong Kong and Kwantung), France, and Mexico.

ANNUAL AVERAGE FOR 1926-1928, IN MILLIONS OF DOLLARS

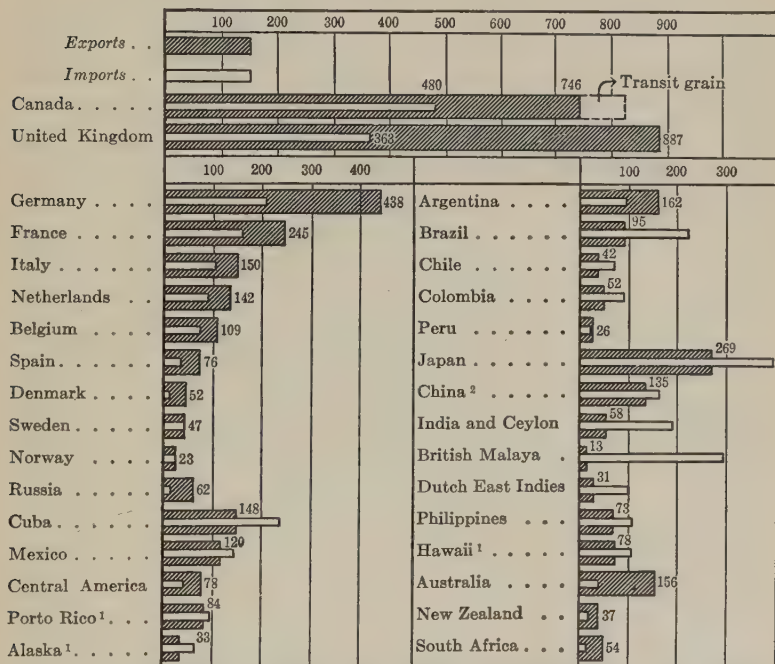


FIG. 97. Diagram showing the trade of the United States with the principal countries, 1926-1928 averages

In each case the broader bar shows the exports of the United States to the specified country, and the narrower bar its imports from that country. The figures at the ends of the bars represent (in millions) the value of exports except where given for both exports and imports. Porto Rico, Alaska, and Hawaii are treated as part of the United States for purposes of trade, but data of the commerce with them are available and are shown in the diagram. See text as to grain in transit through Canada to Europe

¹ Not included in foreign-trade statistics.

² Including Hong Kong and Kwantung.

Particular interest attaches to the effect of the World War on the trade with the several countries (see Fig. 98). In considering the increases it should be borne in mind that prices of the goods covered average from 25 to 35 per cent higher than before the war. In the case of several of the countries the increase in value of trade, particularly on the side of our imports from them, is largely attributable to this cause.

Germany and the Netherlands are the only major countries to which our average annual exports for the period 1926-1928 show an increase of less than 50 per cent as compared with the prewar period 1910-1914. On account of the indirect trade through the Netherlands the true increase is very possibly higher than is shown. In 1928 the exports to Germany were 54 per cent greater than before the war. The major Allied countries have sufficiently recovered to be able to take a considerably larger volume of American goods than they did before the war, even after allowing for the advance in prices; the increase for Italy and Belgium is marked. A very great gain appears in the shipments to the Scandinavian countries. Most of the European countries, as might be expected, show less increase in the imports supplied to the United States than in our exports to them. The exception in the case of the Netherlands is due to larger American purchases of colonial products reshipped through that country, and perhaps to greater indirect purchases from Germany through this gateway.

Trade in both directions with many individual countries outside of Europe shows extraordinary gain over the prewar period. Thus exports to Colombia, Venezuela, Japan, India and Ceylon, and the Dutch East Indies are from five to ten times as great in value. Imports from a number of the major countries have multiplied from fourfold to as high as twelvefold in value, the greatest increase being in those from British Malaya, the result of the immense expansion in purchases of rubber. In 1928 and 1929, to be sure, by reason of the great fall in the price of rubber, the imports

RELATIVE NUMBER FOR 1926-1928 ON BASE 1910-1914 AS 100

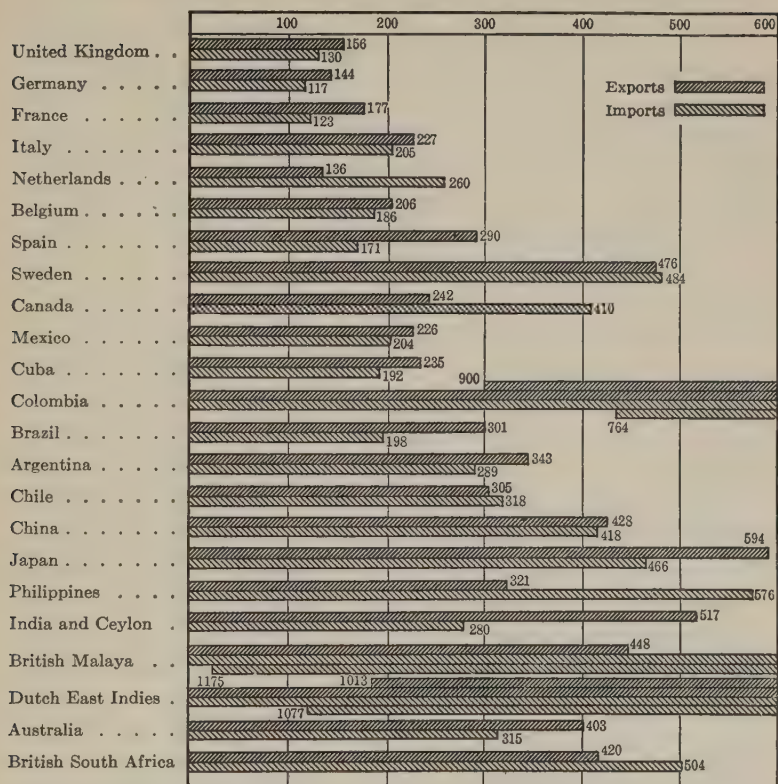


FIG. 98. Diagram showing the increase in the average annual trade of the United States with the principal countries between 1910-1914 and 1926-1928

The figures are in the form of relative numbers for 1926-1928 as compared with 1910-1914 taken as 100. For example, the average annual exports to the United Kingdom in 1926-1928 were equal to 156 per cent of the average for the prewar years, or an increase of 56 per cent. A part of the increase in most if not all cases is due to higher prices. In the trade with all countries combined, the prices of export goods from 1926 to 1928 averaged about 27 per cent higher than in 1913, and the corresponding increase in prices for imports averaged about 32 per cent. Changes in boundaries affect somewhat the comparability of the data for Germany, France, Italy, and Belgium. The increase in exports to the United Kingdom and certain other European countries is somewhat understated, because no adjustment can be made for grain shipped to them through Canada, a practice which has increased greatly. The figures for exports to Canada are adjusted to exclude such grain

from British Malaya were much less in value than the average for 1926-1928 shown in Fig. 98.

What may conveniently be called the dispersion factor for individual commodities is much greater in our exports than in our imports. In the case of many exports each is sent in significant quantities to many different countries, whereas in the case of most of the major imports each comes chiefly from a few countries, often from only one or two. It follows that in general the exports which are sent to any given country are much more diversified than the imports received from it. The explanation lies in the difference in economic character between the exports of the United States and its imports. A large proportion of the export commodities are manufactured articles. Many countries do not produce these, and they are therefore distributed widely. Moreover, our major exports of foodstuffs and raw materials are commodities of widespread demand either for direct consumption by masses of people or for conversion in factories into articles of general use. Consequently these too go to several or many countries. On the other hand, the wide diversity of its own resources and industries makes it unnecessary for the United States to import most of the common commodities of widespread origin. It has to import practically none of the products of temperate-zone agriculture or of the most used minerals. The imports of foodstuffs and of vegetable raw materials are largely such as are produced only under special conditions of soil and climate. Most of the minerals imported are more or less rare. Most of the countries of the world, having less varied resources than the United States, export a rather narrow range of foodstuffs and materials.

The United States imports silk principally from Japan; sugar from Cuba, Porto Rico, the Philippines, and Hawaii; coffee from Brazil and Colombia; nitrates from Chile; copper from Mexico, Chile, and the Belgian Congo; rubber from British Malaya, the Dutch East Indies, and India and Ceylon; jute from India; wool from Argentina and Australia; and tin from British Malaya. Correspondingly, we

find, for example, that silk makes up about five sixths of the imports from Japan, and sugar the same proportion of what is bought from Cuba. Rubber and tin constitute more than 95 per cent of the total purchases from British Malaya. There are numerous other cases in which one or two or at most half a dozen articles make up the great bulk of the total imports of the United States from a given country. Its purchases from most European countries, with their diversified and advanced industries, are, of course, much more various.

SECTION 11. THE FUTURE OF AMERICAN TRADE

The volume, character, and development of the foreign trade of the United States are thus quite what would be expected from the general economic position and history of the country. Foreign trade is relatively much less important in its life than in that of most major countries. That the trade is as large as it is results from the high standards of living in America. The composition of the exports and the imports reflects the large measure of national self-sufficiency. The growth of trade has been rapid, but not faster than that of domestic production. With the development of its industries manufactured goods have played a greater and greater part in the exports of the United States, and raw materials in the imports. Nevertheless the proportion of the output of the factories which goes abroad is small, and is scarcely greater than a quarter of a century ago. The country is still in a position to export largely of the products of its soil.

Unless untoward events occur at home or abroad there is likely to be no sudden change in the relative importance or the economic character of the trade with foreign countries. Should the forces at present operating continue, the volume will continue to grow apace, parallel with further advance in domestic production. Exports will be more and more of manufactured goods. The ratio of exports to the total out-

put of factory products, and, indeed, to the total production of movable commodities, is likely to increase slowly; but their ratio to the aggregate of all goods and services, including those not by nature exportable, will probably remain more or less stationary.

At the close of the war the opinion was very commonly voiced that recovery in Europe would mean a severe setback in the foreign trade of the United States. Thus far quite the contrary has happened, and neither the next few years nor the more distant future is likely to tell a very different story. The causes that are adding to the efficiency of American industry are of a fundamental and cumulative character. It is true that since 1922 Europe's exports have increased more than have those of the United States, but this is due to special circumstances that are apparently bound to disappear. Europe has been recovering from a tremendous débâcle; America has been proceeding on a steady course. Moreover, American foreign sales of farm products, which count far more in its exports than in those of most European countries, have been stationary. In the export of manufactured goods, the field where the United States competes with Europe, it has even somewhat outdistanced that continent during this period. Now that such goods have become the larger fraction of America's total foreign sales its competitive position has become extremely strong.

Indeed, it has become clear that America's ability to compete with Europe is a question less perplexing than that of Europe's ability to keep up with America in the export of factory products. The greatest good to the greatest number among the producers of the United States demands that Europe's production and trade not only shall be fully restored but shall go on increasing as it did before the war. A nation does not gain by the losses of competing countries. If Europe is to be a good market for American cotton, wheat, and pork, that continent must have a big export trade. The volume of American exports, even in many lines of manufactures, particularly machinery and vehicles, is de-

pendent upon Europe's own purchases. Europe cannot buy from the United States without selling goods somewhere outside its borders.

The recovery and progress of Europe means sharper competition with some American products in non-European countries. It results in actually cutting down the exportation of certain goods from the United States, but it tends to strengthen the demand for other American goods — not merely agricultural products but also factory products, and not merely in Europe itself but in other continents. Enhanced buying power of European countries means added prosperity for Latin America, the Far East, and Africa, which sell them foodstuffs and raw materials. This gives those regions, in turn, added ability to buy manufactures both from European countries and from the United States.

Most of the European countries have scarcely yet fully recovered from the terrific shock of the war. In the aggregate they are probably still producing and exporting less than before the tragedy at Sarajevo set Europe afire. Britain's exports, quantitatively, are about four fifths of their prewar volume. Europe as a whole is doing somewhat better than England. The encouraging thing is that conditions now are much better than during the years immediately after the war. The total foreign trade of European countries was about 65 per cent greater in 1928 than in 1921, and on the export side the gain was nearly 75 per cent. The destruction of capital, the dislocation of industry, the loss of man power by the war, the heavy burden of taxation, labor difficulties, and political unrest still hamper progress; but if peace can be maintained, these fetters should gradually be shaken off. The efficiency of European industry is being promoted by very considerable investment of American capital and by lessons from American methods of production, and the normal energy and capacity of Europe's people is again, as before the war, making for steady economic progress.

Much is said about the advantage enjoyed by European countries by reason of their low rate of wages. In certain

commodities the low-wage country can undersell the high-wage. In many more commodities, however, the opposite is the case: instead of high wages causing high costs of production, low costs of production cause high wages. At least this is the case where low costs are due, as in America, to such factors as rich resources, lavish application of capital, advanced technique, and high skill on the part of the workers. A country that produces much per capita can at the same time maintain high wages and sell cheaply abroad.

There is room for expansion in the export trade of both Europe and America. The history of the past century shows that under normal conditions world demand for manufactured goods rises steadily. In times of peace practically every country has tended to advance its production and its standard of living. The same causes which have made for ever higher economic efficiency in the United States are present in greater or less measure all over the world. Discovery, invention, application of capital, and education work their beneficent results everywhere. The more advanced countries help the less advanced — not so much with altruistic intent as because it pays to do so. They send thither their capital, their business managers, their engineers, their teachers, their technical publications. Enhanced productive capacity among the countries of the world reflects itself, above all, in greater consumption of manufactured goods, that class which has now become the dominant part of American exports. The demand for the bare necessities of life is limited. People want only about so much of the basic foods, and very little clothing suffices for modesty and warmth; but there is no limit to the desire for greater variety and quantity of the more highly elaborated goods. When a new or backward country finds itself able to increase its output of foodstuffs or raw materials, almost the first thing it does is to import more manufactured goods.

The fear that the development of manufactures in the newer and the more backward countries themselves will cut down the demand for the products of the leading industrial

countries is allayed by past experience. For decades such countries have, in fact, been developing their manufacturing industries; yet, save for the demoralization resulting from the war, they have constantly imported more manufactured products. The United States itself, in spite of its immense progress in manufacturing, has steadily increased its imports from Europe. If one adds together the exports of manufactured goods from the United States and from Europe, he will find that down to the outbreak of the World War the aggregate was rising very rapidly. Competition in world markets was as active then as now, but every industrial country was gaining in foreign sales.

This tendency toward increased world trade in manufactures as a group does not, of course, appear in every kind of manufactured goods. New factories in countries which formerly imported some given article may cut down their imports of that article, but the buying power thus released is normally transferred to the importation of other manufactured products. Obviously one of the immediate effects of expansion of manufacturing industry in such countries is increased demand for the machinery with which to equip new plants. Moreover, hand in hand with the development of factories there usually goes the development of mining industries and transportation facilities. The older industrial countries therefore find increasing foreign demand for material and equipment for these. Still more important, however, than the direct demand for manufactured goods in creating new productive facilities is the general advance in standards of living that comes with developing industry. The country becomes richer, and its consumers can afford greater variety of goods. Experience of the advantage and convenience of each new article stimulates the people to seek other new articles.

The normal thing in foreign trade, in this country as in others, is growth. It needs only the soil of peace and coöperation among nations.

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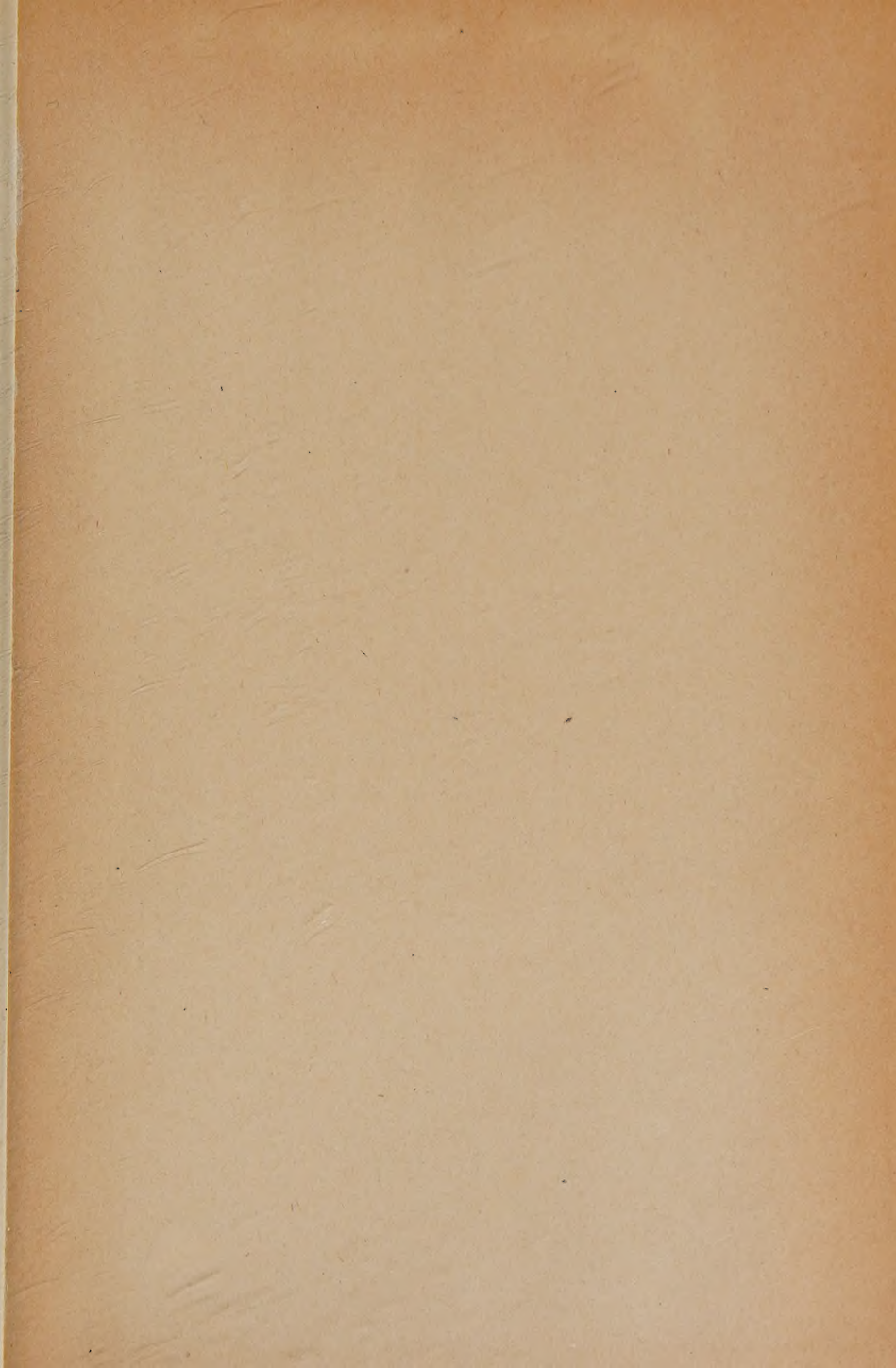
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